AIR UNIVERSITY review

JULY-AUGUST 1969

DIRECT SUPPORT

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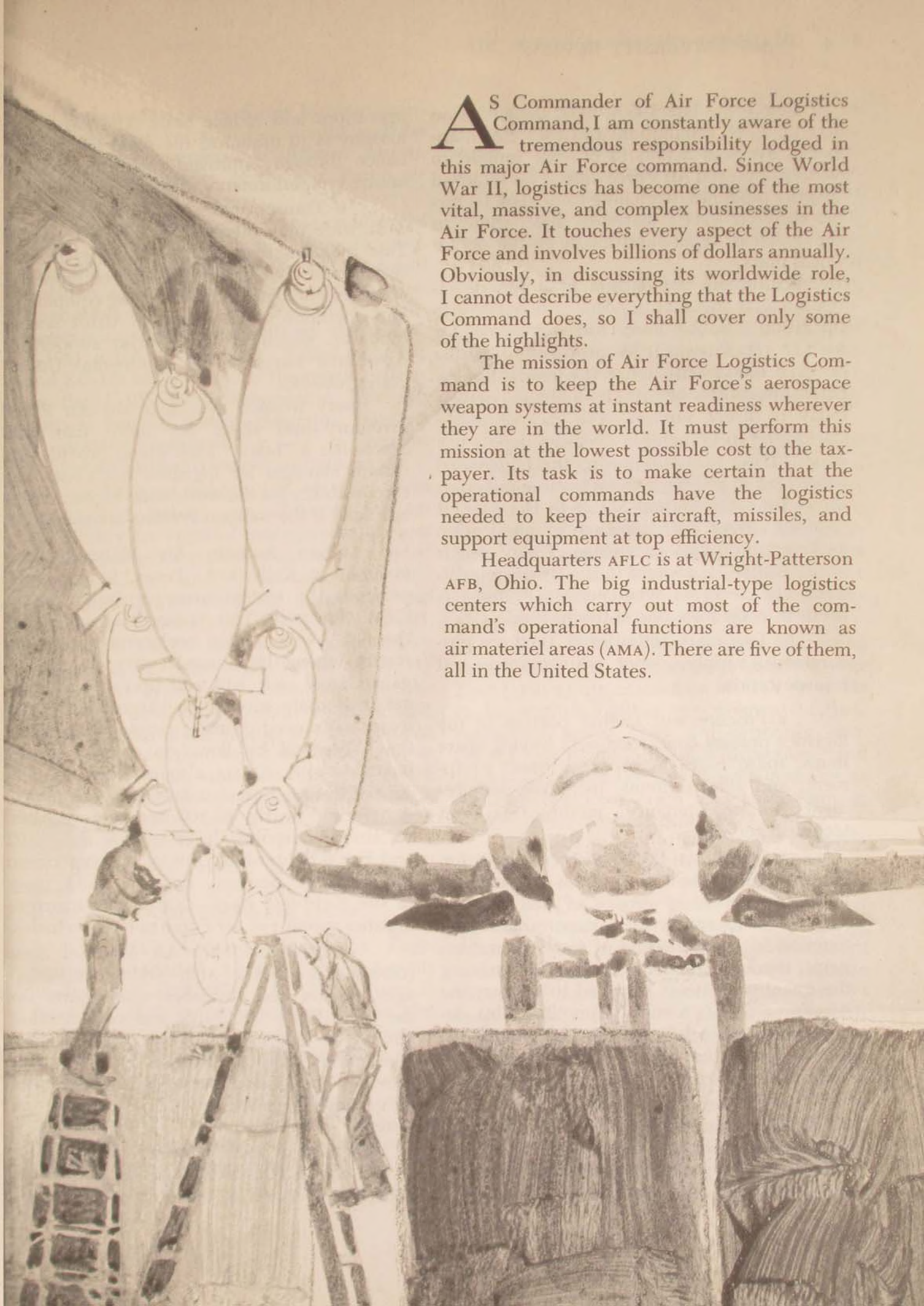
the cover

Probably no other term better expresses the primary mission of Air Force Logistics Command than "direct support." As General Jack G. Merrell, Commander, AFLC, explains it, "Direct support means the high-speed movement of priority and high-value materials direct from the United States to the user." In this issue of the *Review*, General Merrell and five of his deputies and directors amplify this theme and discuss other sophisticated functions of AFLC.

AIR FORCE LOGISTICS COMMAND

General Jack G. Merrell



AS Commander of Air Force Logistics Command, I am constantly aware of the tremendous responsibility lodged in this major Air Force command. Since World War II, logistics has become one of the most vital, massive, and complex businesses in the Air Force. It touches every aspect of the Air Force and involves billions of dollars annually. Obviously, in discussing its worldwide role, I cannot describe everything that the Logistics Command does, so I shall cover only some of the highlights.

The mission of Air Force Logistics Command is to keep the Air Force's aerospace weapon systems at instant readiness wherever they are in the world. It must perform this mission at the lowest possible cost to the taxpayer. Its task is to make certain that the operational commands have the logistics needed to keep their aircraft, missiles, and support equipment at top efficiency.

Headquarters AFLC is at Wright-Patterson AFB, Ohio. The big industrial-type logistics centers which carry out most of the command's operational functions are known as air materiel areas (AMA). There are five of them, all in the United States.

Before the late 1950s, AFLC depended on its U.S.-based installations and a selected number of overseas depots to provide support to widely deployed Air Force units. This required lengthy pipelines, stretching from manufacturers through AFLC's stateside installations to the overseas depots and finally to the operational units.

Within the last decade AFLC has developed a new logistics concept and put it into operation. The Air Force today is geared for instant retaliation. It is prepared to strike decisive blows with what it already has on hand if hostilities begin. The logistics concept today is *direct support*. The day of costly stockpiling in vulnerable overseas depots has ended. Direct support means the high-speed movement of priority and high-value materials direct from the United States to the user. It requires almost instantaneous communication and electronic data processing. Today an Air Force activity anywhere in the world requisitions and receives whatever USAF items it needs directly from one of the stateside AMA's.

The four main activities of AFLC are procurement, supply, depot maintenance, and transportation.

• Procurement is that portion of the logistics process concerned with buying spare items, spare parts, aerospace ground equipment, and related items, including requirements for maintenance, modification, and technical services.

• Supply is the nucleus of logistics. Supply management techniques are tailored to fit the nature of groups of items in the Air Force inventory. An important supply function is the cataloging of some 1.7 million items used by the Air Force. Determining the quantity of items required to support the Air Force also is a supply function. This determining of needs, or computing Air Force requirements, has often been called the "heart of logistics."

• Maintenance accounts for the work of 100,000 persons, about half of whom are off-base contract personnel, who see to it that equipment performs its intended function. Information is constantly collected to improve operations and reduce costs. The basic philosophy is to minimize the need for maintenance through improved reliability and to ensure top performance at the least cost.

• Transportation is responsible for worldwide movement of Air Force materiel. This includes storage, warehousing, preservation, and packaging of Air Force property, management of materials-handling equipment, and operation of the Logistics Airlift System (LOGAIR), which provides airlift support to Air Force bases in the continental United States (CONUS).

Every weapon system in the Air Force inventory—and there are more than 300 types—has a "home" AMA which provides its system manager for logistics. Each AMA has responsibility for the worldwide logistics management of the weapon systems assigned to it.

• San Antonio Air Materiel Area (SAAMA) at Kelly AFB, Texas, for example, provides the system manager for the giant C-5A transport. This means that whenever the C-5A will need a replacement part—no matter where the transport may be—the organizational unit will call upon SAAMA and get immediate service by cargo aircraft delivery. If in need of major repair or overhaul, the C-5A will be flown to SAAMA'S maintenance shops. SAAMA also manages 63 percent of the Air Force's total engine inventory, numbering nearly 40,000 separate engines. Its aircraft responsibilities include the F-102 and F-106 fighter-interceptors, the supersonic B-58 Hustler bomber, and the C-5A, now in the flight-test stage. SAAMA also manages logistics support of Air Force re-entry vehicles.

• Oklahoma City Air Materiel Area (OCAMA) at Tinker AFB, Oklahoma, manages repairs and furnishes spare parts for the B-52, B-47, C/KC-135, and certain other aircraft as well as a number of aircraft engines and airborne missiles. OCAMA also provides the system manager for a number of ground communications-electronics systems.

• Ogden Air Materiel Area (OOAMA) at Hill AFB, Utah, takes logistics care of the Titan II, Titan III, and the solid-fueled

Minuteman ICBM. It performs logistics management of the versatile F-4 aircraft and the F-101 Voodoo supersonic fighter. OOAMA manages the logistics of the Air Force air munitions program.

• Sacramento Air Materiel Area (SMAMA) at McClellan AFB, California, manages the logistics support for all Air Force satellites and satellite-tracking systems. It is responsible for the new F-111A variable-sweep-wing fighter, as well as the F-100, F-104, F-105, F-84, F-86, T-28, A-1, T-6, and EC-121 aircraft, and is the repair activity on the F-106 fighter-interceptor. The Air Force's ground power generator program is SMAMA's responsibility, as is systems support for SAGE and BMEWS equipment.

• Warner Robins Air Materiel Area (WRAMA) at Robins AFB, Georgia, has responsibility for logistics management of most of the Air Force's transport aircraft. Included are the C-140 and C-141 jet transports, C-130 and C-133 turboprop transports, and the C-46, C/AC-47, C-118, C-119, C-123, and C-124. WRAMA has similar responsibility for the B-57, B-66, eight types of utility aircraft, 13 types of helicopters, and the X-142 and X-19 experimental VTOL aircraft, as well as the Mace missile and the Firebee target drone. Other responsibilities include bomb, navigation, and fire-control systems, airborne communications equipment, vehicles, and components, and a number of other equipment classes.

Besides the AMA's, AFLC has several other specialized activities: GEEIA, AGMC, MASDC, ALSC, APRE, APRFE, and AFCMC.

• AFLC's Ground Electronics Engineering Installation Agency (GEEIA) has its headquarters at Griffiss AFB, New York. It provides single-point management for the engineering, installation, and maintenance of Air Force ground communications-electronics equipment including radio, radar, teletype, and telephone systems. About 12,000 people, mostly military, make up 14 squadrons operating in five regions located throughout the world.

• The Aerospace Guidance and Metrology Center (AGMC) is located at Newark Air Force Station, Ohio. As the single point within the Air Force for the repair and calibration of inertial guidance systems, the AGMC provides direct support to the Minuteman and Titan missile systems and the navigational system of the F-4 aircraft.

• AFLC is the Air Force's executive director of the Department of Defense Military Aircraft Storage and Disposition Center (MASDC), Davis-Monthan AFB, Arizona. The center stores, reclaims, and redistributes inactive aircraft for all three military services.

• AFLC's Advanced Logistics Systems Center (ALSC), located at Wright-Patterson, is charged with developing a "21st Century Logistics System" and implementing it in the early 1970s. Using third-generation computers, advanced communications, and new techniques in the management sciences, the ALSC is expected to produce new concepts and procedures in Air Force logistics.

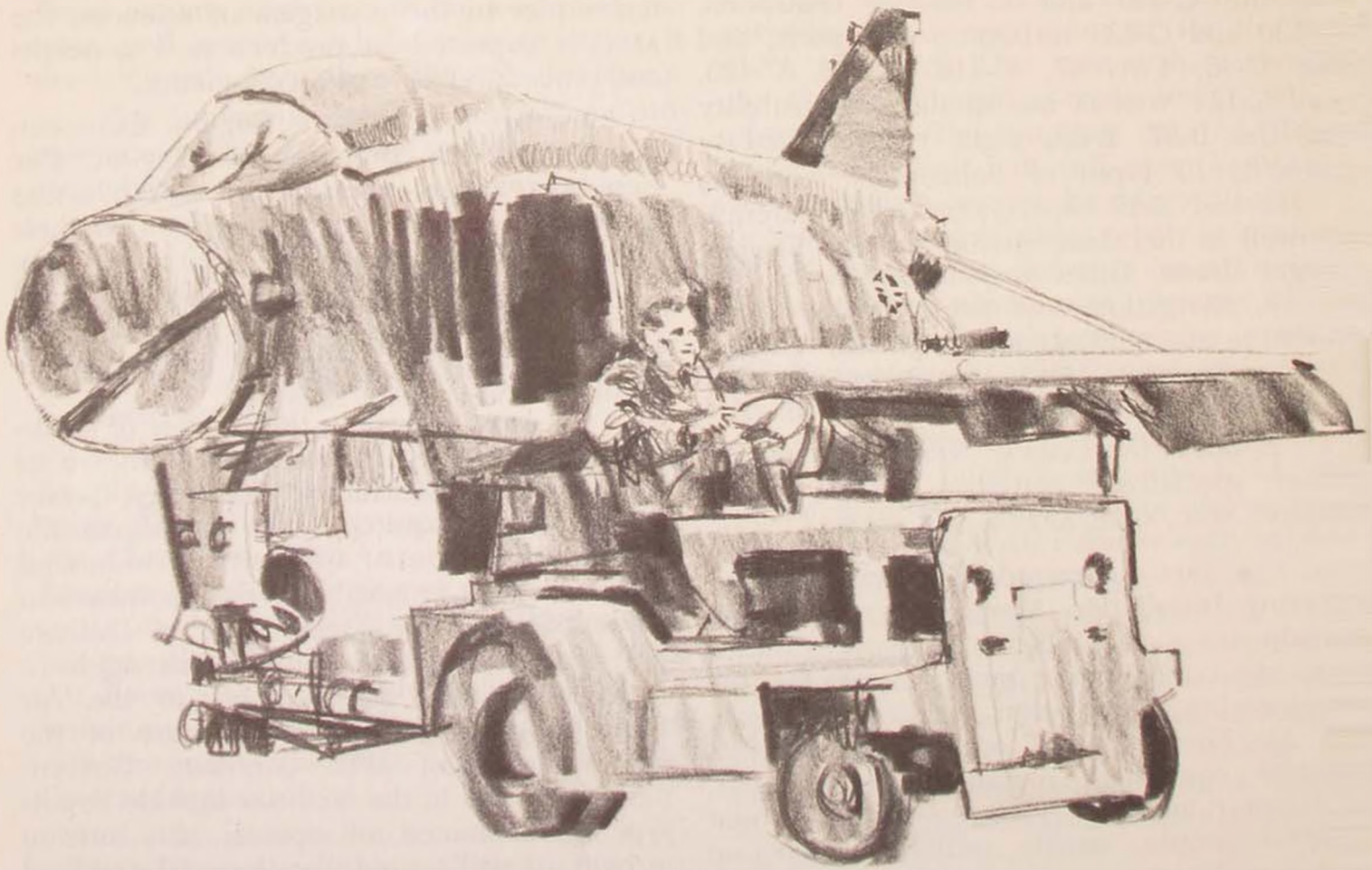
• Air Procurement Region, European (APRE) and Air Procurement Region, Far East (APRFE) are extensions of AFLC overseas to accomplish logistics procurement in their respective areas. They are primarily concerned with Modification/Inspection and Repair as Necessary (IRAN) procurements as well as contractor crash and battle-damage repairs in the overseas theaters.

• AFLC is now in the process of establishing a new organization to be known as the Air Force Contract Maintenance Center (AFCMC). The center will be responsible for administration of contracts at industrial plants located primarily in the southeastern United States. The Department of Defense previously assigned contract management responsibility for these plants to the Air Force Logistics Command because of the predominance of AFLC contracts. Government contracts in the facilities include depot-type maintenance of special air mission aircraft, as well as modification and overhaul work on about one-fourth of the first-line fighter and cargo aircraft in the Air Force operational inventory. Headquarters for the

center will be at Wright-Patterson and will be staffed by highly qualified military and civilian personnel with specialized experience in contract administration, property management, production, flight test, and quality control. The headquarters staff will supervise the operations of field detachments that perform contract management functions at various contractor plant sites. To become operational in September 1969, the center will assume the contract management responsibilities formerly accomplished by the AMA's.

TO DESCRIBE where we have been, I need only recall World War II and the story of mass logistics, which is exactly what we had then. We moved supplies overseas by the hundreds and thousands of tons; the bigger the stock of supplies we got over there, the more difficult it became to keep track of them. Much of it, we could not even count, nor did we know what was in some of the boxes. In effect, it was lost—just as lost as if we had never procured it. That is the story—oversimplified—of what happened. This is the kind of logistics the Air Force has been striving to get away from ever since World War II.

At the end of that war and for a period thereafter, we had a great many depots in the United States and overseas. We recognized that the materiel in those depots and in the pipeline represented a potential savings of



Stripped and ready for inspection and repair, an F-4C Phantom II heads for the maintenance line.

great magnitude if, instead, we could supply overseas units direct from CONUS installations. Increased airlift capability, improved high-speed communications facilities, and the conversion of manual supply systems to automatic data-processing equipment made it possible to begin the phase-out of many of the depots in the United States and overseas in the mid-50s. By the end of the decade, we had closed all our overseas depots. In the United States we have phased out quite a number of installations, so that by the middle of 1969—with the phase-out of the Mobile AMA—we will be down to five air materiel areas and four specialized activities.

During the past 10 years the dollar value of the Air Force's operating fleet of aircraft and missiles increased by 50 percent, from $20 billion in 1958 to $31.2 billion in 1968. This happened because today's more efficient weapon systems are also much more complex and costly. Of course they require more sophisticated spare items and test equipment, but we have been able to hold back the dollar value of the spares inventory from $12.7 billion in 1958 to $12.2 billion in 1968. This saving has been realized despite an increase since 1965 caused by the war in Vietnam.

Ten years ago each dollar's worth of operating aircraft or missile was supported by 64 cents in spares. Today only 39 cents is needed, and yet we have our weapon systems "in commission," or ready to perform their mission, a much greater percentage of the time—79 percent compared with 65 percent 10 years ago.

How have we done this? We have done it with improved communications and improved computer systems at the bases and the depots and by being more accurate in our inventories and more responsive to worldwide needs.

As weapon systems became more complex, the number of line items in our inventory hit a high mark of more than 2,000,000 items at the start of the sixties. Since then, although we have introduced more complex systems into our inventory, we have continued a highly concentrated effort to purge old items out of the system. We have reduced the number of line items now to about 1,700,000.

Early in the sixties the Defense Supply Agency (DSA) was created to increase the efficiency of, and reduce the cost of managing, common military supply items and logistics services by eliminating overlapping and duplicating organizations, systems, and procedures of the military services.* As a result, some 800,000 Air Force common items have been turned over to DSA, leaving the Air Force with about 900,000 items for which AFLC has sole management responsibility. Basically, the Air Force has retained for its own management the complex items, the technical items that require specialized engineering support to manage.

During this same time period we have reduced our manpower strength from 212,000 to 139,000.

The size of AFLC's business is impressive. For example, our financial program totaled $8.4 billion in FY 1968. We repaired some 9000 aircraft and overhauled about 14,000 engines. Component and accessory repair amounted to 2.8 million units. We received more than 15 million "retail demands" from our "customers." This, of course, considerably oversimplifies the millions of actions that are taken in our AMA's and specialized activities, but it does give a frame of reference as to the scope of AFLC's operation.

LET US turn now to the Air Force logistics performance in Southeast Asia and some of the lessons we have learned there. The best measure of the job we are doing is the fact that our units out there are flying two or three times their normal flying-hour program under tough circumstances, and they are doing it successfully. Not Operationally Ready, Supply (NORS) rates are lower than ever before in the history of the Air Force.

*Editor's note: The Defense Supply Agency was the subject of an article by Lieutenant General Earl C. Hedlund, its Director, in *Air University Review*, XIX, 4 (May-June 1968), 2–12.

These units are a professional force—as are those of the Army and Navy—the most professional force the world has ever seen, and Americans have every reason to be proud of them.

The AFLC also has a very professional force of logisticians. Long gone is the day when you could put a new second lieutenant out with the supply sergeant and have him learn the business in a few weeks. Supply is a highly sophisticated and specialized business today, and the people in it must be highly professional, competent, well educated, and well motivated. The successful job that has been done in supporting the combat forces clearly demonstrates that we do indeed have such people.

Despite the necessary emphasis on Southeast Asia, the Logistics Command managed simultaneously to increase the effectiveness of its support for Air Force units worldwide. Aircraft, missiles, and equipment—wherever located—were kept at the highest level of operational readiness in Air Force history.

Now some of the logistics lessons we have learned in Southeast Asia.

First, the Air Force in the early sixties had some problems to solve in making the conversion from the strategy of massive retaliation to that of controlled or selective response. We had not solved those problems when the Southeast Asia buildup occurred. I can best illustrate what I mean by talking about munitions.

At the beginning of operations in Southeast Asia we had some 300,000 tons of conventional munitions in storage, but we had a very small production base. Suddenly we found ourselves in a conventional war and things had to start moving, including production of munitions. Fortunately, the Army and the Navy had saved some tooling, and we were able to reactivate production rather quickly. We "bottomed out" in the spring and summer of 1966—that was when production began to exceed consumption. Inventories got pretty low, but they never actually ran out. We did have some component shortages at individual bases, such as arming wires, fins, and fuzes, but that was all. Our shortage, technically, was a distribution matter.

Now we have regained a very comfortable production position, despite the problems we had in converting from a static system to an active one. We had to control a pipeline and inventories from the factory to the storage point, to the shipping point, on board specialized ships, for movement to Southeast Asia. We needed control at the offloading point, control to the base, and control on the base to the airplane. We had a lot of learning to do, to get operating smoothly.

So the first lesson learned is to keep an active production *base* in the future. Incidentally, we have very good reason to keep our production as close to consumption as possible; if we don't, we're going to have excess munitions after Southeast Asia.

Lesson number two also concerns a production base—for aircraft. When the buildup began in Southeast Asia the Air Force had only one real production line going, the F-4, and that one was shared with the Navy. Fortunately, working with the Navy, the Air Force had taken some preparatory actions with the contractor and some of their suppliers to increase production. We had put together a mobilization effort whereby we banked the production line with parts so that the production rate could be increased as rapidly as possible. Even with these precautionary actions, it still took almost a year and a half to double our aircraft production.

Obviously, a planned production acceleration is not enough to get more aircraft quickly. One way to be prepared for conventional contingency conflicts is to have larger tactical air forces, both men and aircraft. Then we could stand some attrition between the start of the contingency and the time when production of aircraft and crews has caught up.

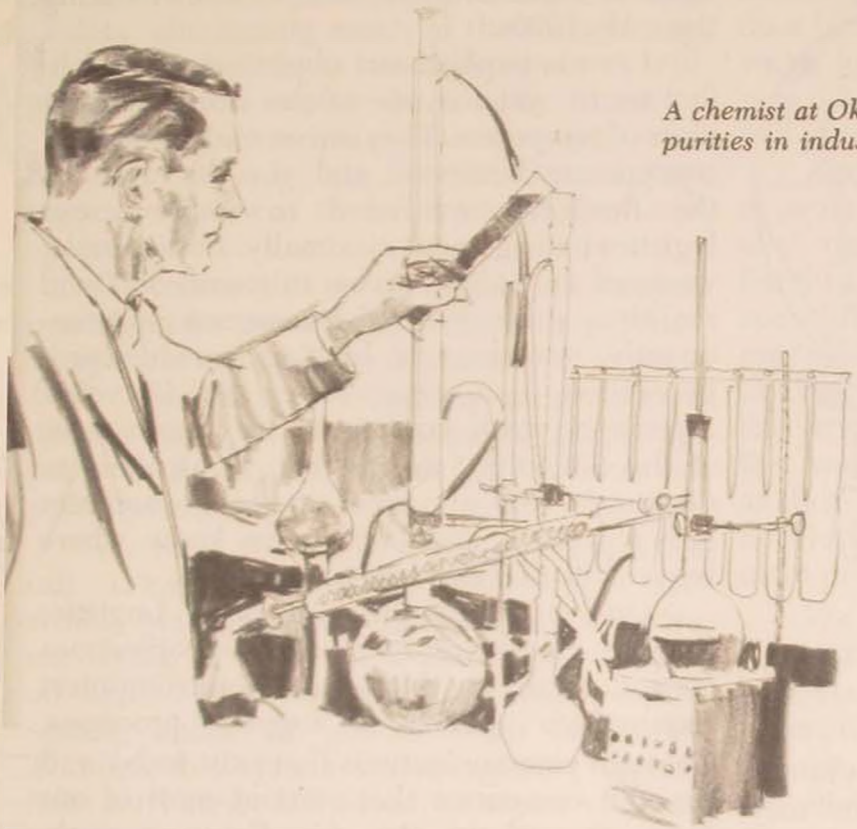
Certainly we could buy more aircraft and put them in cold storage for a contingency. That would be very expensive, but it could be done. However, there is no way to put crews in cold storage.

The base situation in Southeast Asia provided lesson number three. At the outset, we crowded our forces onto such bases as Tan Son Nhut, Bien Hoa, and Da Nang. We did it in a relatively short time and became operational in a matter of days after our forces arrived. However, when those bases got so crowded that we had to have others, it took a year to build new bases like those at Cam Ranh Bay and Tuy Hoa.

The Air Force, tactically, not only requires a capability to move into a bare-base situation in a matter of hours and operate immediately; it also must actually be able to move into a "no-base" situation, where it has only the real estate, and create a base within a matter of days. This can be done by making full use of our future air logistics capability.

So we at AFLC are pushing a number of projects, working with all the agencies involved. For example, with the Air Force Systems Command, we are developing vertical structures which are lightweight and very durable and which can be erected quickly. With the Army, we are working on airfield paving materials that will enable us to create a quick runway capability, assisted by the airlifting and airdropping of equipment required to do the job.

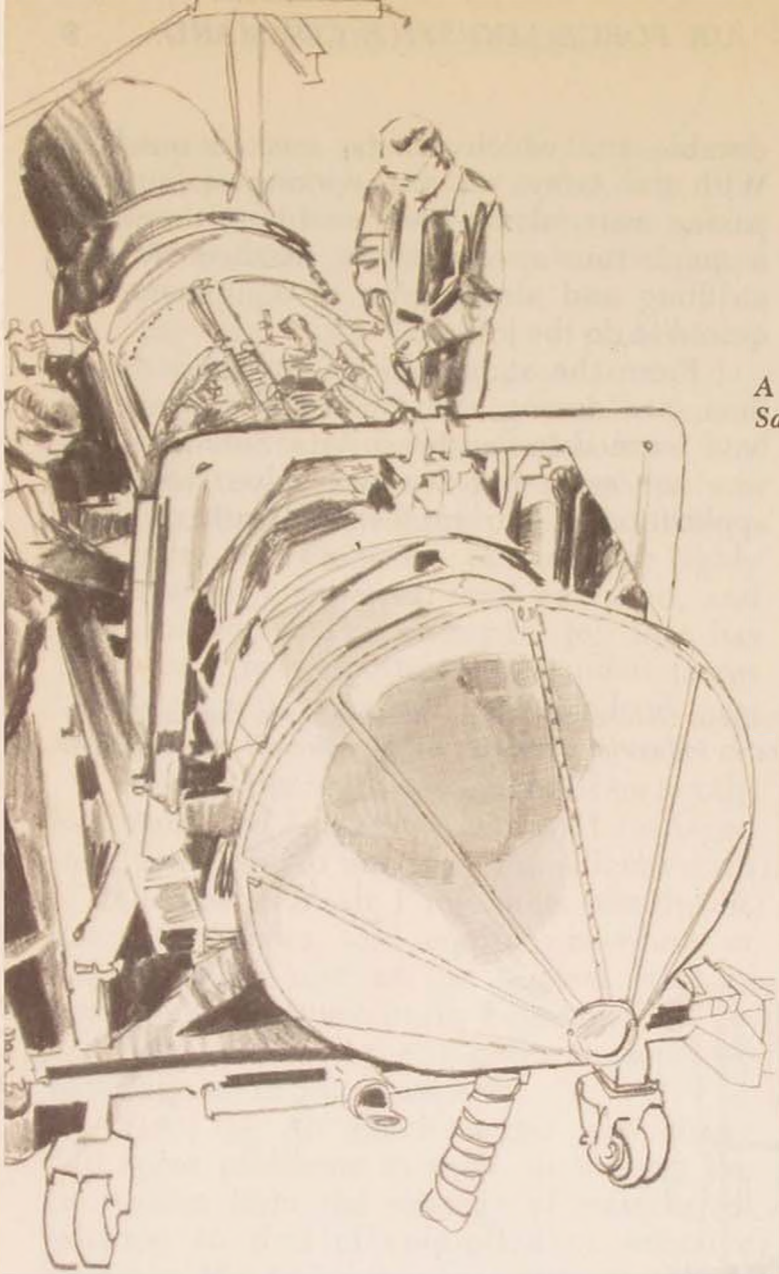
From the standpoint of logistics, these, then, are among the important lessons we have learned in Southeast Asia. Solving them was not easy, but we did solve them—by application of our professional military and civilian talent and the effective use of our data-processing machinery.



A chemist at Oklahoma City Air Materiel Area checks for impurities in industrial chemicals used in aircraft maintenance.

NOW LET me turn to some of our plans for the future. Looking ahead, we have several important things to accomplish. First, we have a great need to modernize our physical plant, for as far ahead as the 1980s.

Obviously, it is not a simple matter to see that far ahead. For example, we don't know what kind of weapons we are going



A J-79 turbojet engine is readied for testing at San Antonio Air Materiel Area, Kelly AFB, Texas.

to have then; experience teaches us this much. And yet, some of the older weapons may still be around. We do know enough about the technology of the future to predict the kind of physical facilities AFLC will need. Accordingly, we are busy right now developing a master plan in this area. We are doing this centrally at AFLC headquarters, with the air materiel areas contributing their input.

Probably our most important project for the future is a program to improve our logistics support responsiveness. Toward this end we have created the Advanced Logistics Systems Center (ALSC) at Headquarters AFLC, on the same command level as the air materiel areas. The center has the job of developing what we think of as a twenty-first century logistics system—and the requirement to make this system operational during the early 1970s.

Let me explain our objectives in simplified terms. AFLC is one of the world's largest users of computers. They are second-generation equipment, however, and do not give us the flexibility we need to improve our logistics management maximally. For example, we need immediate access to stored data and real-time processing of transactions. Consequently, we are now looking toward third-generation equipment. From our 15 years' experience with computers we know some of the difficulties involved in using them to do a job. We are now over our computer growing pains and believe we know where we are heading and how to get there.

Our plan, in the Advanced Logistics Systems Center, is to develop specifications for and obtain the third-generation computers required to update our logistics processes. Through communications that exist today and through computers that exist at most of our bases throughout the Air Force—properly programmed with software—we have the ability to develop a "closed loop" logistics system for all items in the Air Force inventory.

The benefits of a closed-loop system can be described simply. We will have the capability at the item manager level in a depot to punch a button and ask for the condition, status, quantity, and location of any single item, at any base, anywhere in the world; and we will get the information on a near real-time basis, meaning a delay of not more than half an hour!

This capability will enable us to do a better job of managing. One of our big prob-

lems today is that we lose visibility of assets in the inventory. If the depots do not know where all assets are, they are just as unavailable as if we had never bought them. With immediate-access storage and real-time processing, the new equipment will make it possible for us to maintain logistics data in what could be called a unified data bank, accessible to Air Force operating units around the world as well as AFLC managers. Decisions by the weapon support manager, the buyer, and the maintenance manager will be based on a current, single-source library of data, eliminating much of the redundancy we have today. In a nutshell, what we will get from such improved visibility of assets is the ability to respond more promptly and accurately, thus giving the Air Force better support at lower cost in inventories and operations.

Of course this is not going to happen overnight, for it is a major undertaking. When completely manned, the center will have some 1450 logisticians, computer programmers, systems analysts, and communications experts. It already has about 1250 aboard, experts reassigned from other AFLC activities.

We have already in being a program we call AFRAMS (Air Force Recoverable Assembly Management System), with which we are trying to maintain a closed-loop system on some 77,000 reparable-type assets representing about $5 billion worth of spares. Through this system we are getting reports from all bases, worldwide, of status changes on these items as they occur. This permits the item manager to know, once he has the initial inventory, the changed status of each reparable-type item, by line item, worldwide. So he knows where his assets are and how many reparables he has. He can better program his repairs at the depot level and control the assets and their redistribution from base to base. This system is still in the early stages, but it represents a definite forward step.

Why do we need a more responsive system with fewer assets and fewer dollars spent? There is always an imperative requirement to reduce the cost of support to the Air Force. Anything we can do to reduce that cost will, within any finite budget, enable the Air Force to buy more research and development and more modernization for the future. And they are urgently needed.

Many of our aircraft—and not just "Puff, the Magic Dragon"—are getting quite old. Statistics show that at the end of 1968 about 60 percent of our aircraft were more than nine years old.

So we need to do everything we can to improve the rate of modernizing our forces. This is one of the reasons AFLC must do a better support job at less cost. Of course, we're looking for more responsiveness anyway, and I think the system I have described will give better responsiveness.

Another project on which we are hard at work is to improve the reliability of the new systems we are acquiring; that is, reliability in a quantitative sense. To improve our older aircraft, we are working on a program that we call IROS (Improved Reliability of Operational Systems). We take an analytical approach to the weak links in each of the weapon systems in the inventory and analyze the deficient items with a view toward developing a systematic reliability improvement program.

We want to find the items that are causing flight safety problems, those that are causing high maintenance man-hours and high repair hours. If we get at those items, systematically, we can attain a high order of improvement in reliability on many of the systems and subsystems that we have. Let me illustrate. We have a tire on one aircraft that has been in use for some time. Since 1962, through great effort, a contractor working with the Air Force has doubled the life of that tire, from 5 landings to 10 before wear-out. We do not know what the practical top limit is, but we ought to get up to 100 landings on those tires before wear-out. That's the kind of improvement I am talking about.

Another example: In recent years, there has been enough advancement in electronics to give us much longer life in electronic systems than we are now getting. We are being plagued with high failure rates of only 25

hours between failures. We ought to be getting 2500 hours between failures. So we are working hard on the systems that we are going to keep in the inventory, to improve these failure rates. This will not only reduce our support cost but also improve the operational capability of our forces.

To improve our support in another area, we have organized in AFLC a division to work with Headquarters USAF, Tactical Air Command, Military Airlift Command, and Air Force Systems Command on the tactical and overall mobility of the Air Force. Manned by some of our most capable people, this organization has the goal of substantially improving the mobility of our forces in the future.

A vital factor in improving the mobility of forces is the C-5A and what it is going to do for our capabilities. By the time we have a full inventory of these aircraft we will have four times the airlift capability that we now have. C-5A-type airplanes will revolutionize air logistics, and the Air Force has a great deal of preparatory work to do.

The Civil Reserve Air Fleet will also be modernizing with aircraft such as the Boeing 747 and the airbus type of aircraft, which will greatly increase airlift capability in any future emergency.

The Air Force must be prepared for this kind of evolution in air logistics. We must also be aware of the reason we should use this capability in peacetime. One of the great gains to be achieved will be reduction in airlift cost per ton-mile. Our costs have been steadily decreasing, with today's direct operating cost of military airlift at less than 10 cents per ton-mile. The capability of the C-5A gives evidence of a direct operating cost at about 4.5 cents per ton-mile. When this rate is reached, many more items will be eligible for airlift from the economic point of view. We are now studying with the Army and the Navy to determine the additional items that will be airlifted.

The Air Force currently moves about 10 percent of its cargo—other than liquids such as fuel, petroleum, and lubricants—by air. It is likely that in the 1970s we will airlift 25 to 30 percent just because it is the economical thing to do. From the standpoint of contingencies, one can visualize the greatly increased capability we will have to move large forces quickly. We must place great emphasis on research and development planning, to take utmost advantage of the greater mobility of our forces.

AIR Force Logistics Command procurement transactions (excluding stock funds*) are at a record high, currently amounting to approximately $2.7 billion annually. It is difficult for the man in the street to comprehend the magnitude of defense procurement and its impact on American society. Let me quote from the Mahon Committee report, issued on 18 July 1968, on this subject:

> The magnitude of defense procurement and logistics activities and policies are such as to directly affect every state and, directly or indirectly, the vast majority of the American people. In 1967 alone, defense prime contract awards totaled $44.6 billion and encompassed 15.1 million separate procurement actions. Inventories of weapons and equipment in use in this same time frame amounted to $95.5 billion. . . .

These staggering sums of public money impose a sacred trust and responsibility on all of us who handle them. Every administrative device we can develop and apply is used to ensure that the best interests of the nation are protected and served.

The Mahon Committee noted this enormous responsibility:

> The basic objective of those charged with the administration of a program of this awesome magnitude is to secure prime quality equipment and weapons systems at reasonable costs and in an efficient manner. The most effective way yet demonstrated to achieve this objective is through timely, competitive procurement. . . . maximum effort must be made by defense procurement and contracting officials to assure the acquisition of new

*A working-capital fund established to provide a simplified means of financing and accounting for the purchase, holding, and sale of common use items.

systems of desired quality at fair and reasonable prices to the government.

The objective, so clearly outlined in the Mahon report, is the guiding principle behind the procurement policies of AFLC. Our major objective has been, and continues to be, to "provide timely support of our operational requirements without sacrificing sound procurement practices and goals." Effective management, both on our part and that of our contractors, is a must. Of course, the public interest must always be our primary concern; nevertheless, we must always ensure that fair and equitable practices govern the buyer-seller relationship.

I have referred at great length to systems, programs, problems, machines, aircraft, and policies. Now I would like to discuss the greatest and most important single resource we have. It outweighs and overshadows everything else. Of course I mean our people, military and civilian, men and women.

Without the vast amount of professional talent in AFLC, little would get done. It is the logistician who solves the problems I have discussed, and it is his skill that will solve future problems. Yet, because of his importance, even he has not escaped our plans for improvement. The future will be filled with unknown problems, of a variety and complexity we can only surmise. Our military and civilian work force must be trained and ready to meet and solve these problems.

Therefore, one of the most important things we are doing for the future is providing for the modernization of our human plant. Looking at our situation today, we are somewhat behind the power curve in some respects. We have made great strides in the last 10 or 15 years in educating our military people. Officers coming on board now, with very few exceptions, are college graduates or better. More than 81 percent of our present officers have bachelor degrees or higher, and in the future it will be 100 percent.

While our civilian work force does not have as high a percentage of college graduates as desired, we are attempting to upgrade their educational level, and as our older civilians retire we will replace them to the maximum extent possible with promising college graduates.

What I am saying is that, capable as our military and civilian workers are at all levels, we must do better if we are to meet the logistics challenges of the world of the 1970s and 1980s.

Someday there will be third-generation computers, and after that a fourth generation. The C-5A system, the airbus, and the heavy-lift helicopter—and only the most imaginative can foresee what is beyond them—will be part and parcel of a vastly complex logistics system different from what we have today. We must have sophisticated and highly trained human resources fully prepared to operate that system. Thus, we must train and train.

This, then, is the true role of Air Force Logistics Command in the aerospace age. Immense, complex, and vital, logistics is still, as it has always been, the lifeblood of a military force.

Hq Air Force Logistics Command

QUANTUM JUMP IN AIR FORCE LOGISTICS SUPPORT

MAJOR GENERAL FREDERICK E. MORRIS, JR.

THE Air Force's ability to respond as quickly and effectively as it has over the past decade to the crises that have caused threats to world peace is due in large part to the Air Force Logistics Command's development of efficient, fast-reacting, computerized management information systems. These systems have provided the data for managers to make the decisions necessary to keep supply pipelines full to Southeast Asia, Western Europe, Africa, the Middle East, or anywhere else in the world where air units have been called upon to deploy.

To further this record of success, AFLC's commander and senior staff officers have discerned a number of overriding reasons to embark on an intensive program to develop what has been termed "a 21st century logistics system for implementation in the early 1970s."[1] This program is dictating significant changes in AFLC computer hardware, communications techniques, and information systems design. To implement these changes, Hq United States Air Force approved a new AFLC organizational entity, the Advanced Logistics Systems Center (ALSC).

The center is designated as the AFLC central agency responsible for planning, designing, developing, machine-programming, and testing future wholesale logistics systems, management information systems, and related data systems and for maintaining both current and future systems. Goals for future systems include (1) faster responsiveness to changes in strategic and tactical operations plans (flexibility); (2) optimum support from available resources (efficiency and cost effectiveness); (3) more accurate, up-to-date data outputs and decision formulas to aid in management decisions (reliability); (4) improved weapon systems support with a minimum inventory (economy); and (5) minimum manual effort at both management and user levels in operating the systems (effective use of human resources).

technology the basis of decision

Planning for these changes began in 1966 following a technological explosion in the performance of computer hardware. These new computers, termed "third generation" in the trade, offered for the first time a selection of fast, reliable, random-access storage devices. They also provided remote inquiry stations through which management people could effectively interrogate data files in a central computer complex from their own work stations and receive near instantaneous replies to their questions in "real time."[2]

Activation of the Advanced Logistics Systems Center began the process of bringing together under centralized control the brainpower qualified to make optimum use of

the new hardware and communications capabilities. The center's staffing includes not only data systems analysts and computer programmers but also logisticians, communications experts, software specialists, industrial engineers, and experts in the fields of planning, research, and systems simulation.

AFLC is confident that these personnel resources will provide the expertise, initiative, and imagination required to handle the task. Indeed, many of our people have background and training acquired through a decade or more of leadership and participation in development of management systems within the command or with other government activities or private organizations that have pioneered in systems design.

swift developments in computer hardware

We can look back from our jet aircraft environment of today and see the limitations of the piston engine we were so proud of in World War II. In the same way we can look backward and see the limitations of the computer-based management systems we so proudly built in the late fifties and the early and middle sixties. It is a measure of the swift developments in computer hardware and systems technology that obsolescence has come about in a matter of half a decade. Comparatively speaking, we have progressed about as far in the computer and systems industry in 15 years as we did in the aircraft industry in 50 years. That the computers have made our modern aircraft and space and missile systems possible is an indication of their importance.

It is because of the rapidity of advances in technology that we can be critical of what we *have* in computer systems and at the same time be proud of what we *did* in computer systems design a relatively short time ago. Our efforts on second-generation systems helped to build knowledge and improve mission capabilities. Utilization of these computer systems *did* help AFLC to control inventories. They helped make possible a higher degree of responsiveness to mission requirements as reflected in better aircraft-operationally-ready rates. These systems helped reduce the relative dollar value of Air Force spares when compared to the dollar value of the weapon systems supported, while types, complexity, and cost of aircraft and missiles increased.

But now these systems are becoming increasingly hard to update in AFLC's more-sophisticated weapon systems environment. The required repetitive machine runs have saturated the second-generation equipment capabilities, even though practically all AFLC computers are being operated 24 hours a day 7 days a week.

third-generation planning started

AFLC management reached the conclusion in early 1966 that it was time to start detailed planning for a move from second-generation computers to the third generation.

Work was begun that fall by our Data Management Division on a long-range hardware-oriented systems update plan, which highlighted the idea of centralizing the data files used in several functional areas. On 23 March 1967 the AFLC Commander, General Kenneth B. Hobson, directed the establishment of an ad hoc group to develop an overall conceptual plan for the command's future logistics systems.

Results of the Data Management Division study were published in April 1967. RAND Corporation furnished views on "desirable system design objectives" on 2 June 1967. At the end of that same month, the ad hoc group forwarded its proposals for "AFLC System Design Concepts" and indicated the direction it believed the new design efforts should take.

All the evidence pointed toward an integrated closed-loop, real-time approach. The recommendations of the ad hoc group called for significant changes, not only in the design of the information systems but also in the physical logistics processes.

In order to exploit the advantages now offered by new computer hardware with its real-time random-access capabilities, AFLC

would have to chart a radically new course. No longer could we make major improvements in the logistics posture by improving current management information systems without policy changes in logistics management, major redesign of the logistics systems themselves, and new techniques in management.

Radical approaches to logistics problems in the past had proved out well. For example, the Air Force Recoverable Assembly Management System (AFRAMS) proved that worldwide asset visibility of high-value Air Force recoverable items is attainable and would help to make possible optimum use of available resources. Analysis of a pilot project for supply of Southeast Asia, called Loggy Sort, highlighted the need for a closed-loop approach, which requires return to managers of information on results of actions from preselected points within the logistics systems.

Other basic design concepts for which enthusiastic support was found included differential management for different classes of items, a unified data base, interlacing of multifunctional responsibilities, and standardized methods of measuring performance. They also included establishment of a cost-effectiveness base, simplification of support requirements at user level, and the adoption of the "crew chief" or "system controller" concept for system management.

Systems Center activated

The planners had suggested the kind of organization that they felt would have to be created in order to accomplish the objectives. However, they left open its relationship to the AFLC commander, that is, whether it should be under one of the staff offices or should be directly under the AFLC commander. All these plans and recommendations and subsequent AFLC Council and Air Force studies culminated with the announcement on 28 September 1967 that effective the following Sunday, 1 October, the AFLC Advanced Logistics Systems Center would be activated and that I was to command it and would report directly to the AFLC commander.

At this point the center was assigned control over the 376 individual automated management information systems used in the management of the approximately 1.7 million different line items cataloged in the Air Force inventory. Our job would be to develop, in a very compressed time frame, a logistics management system embodying the recommended concepts. First, it would provide a decision-making process that would be more responsive to changes in tactical and strategic situations; would provide a means for faster replenishment, distribution, and repair of resources; and would operate with a minimum overall inventory. Second, it would do all these things more economically. AFLC is confident that, with the new management concepts and the new hardware, these seemingly contradictory objectives will be realized.

Our first tasks were to firm up an optimum organizational structure and develop a master plan for achievement of our logistics objectives. We decided to do both tasks simultaneously. We selected a group of nearly 90 experts in various functional areas and put them to work in a centralized location, with a target date of 1 March 1968 for development of a master plan for the command's program through calendar year 1972. We immediately began identifying the best-qualified people available in AFLC and started small task groups exploring the specific methods for attaining the overall objectives. By 1 January 1968 we had over 1000 of our people on board.

task-oriented organization structure

The center was structured into three staff offices and four directorates, the directorates composed of three to five divisions.

First of the staff offices to become functional was Plans, charged with developing the Advanced Logistics System Master Plan, five years into the future, and providing continuous update to it. The planners are responsible for ensuring that the plan is at all times kept compatible with overall Air

Force and AFLC objectives and priorities.

Second was Management Control, given responsibility for controlling such items as manpower, funds, physical space, organizational restructuring, management standards and evaluation, and internal administrative policies and controls. It also has responsibility for publications, project milestone accomplishment, computer programmer training, and the myriad of other general management functions essential for such an organization.

The third staff office established was Industrial Engineering, with the mission of applying industrial engineering expertise and techniques to the design and development of the logistics and management information systems and to programs for quality control, reliability insurance, cost effectiveness, and human factors engineering.

While the staff offices were being manned to monitor and assist in controlling the ALSC mission, the four directorates were activated and assigned specific parts of the mission.

The Directorate of Systems Design was assigned responsibility for providing direction for all systems design and redesign projects. Directorate personnel supervise all facets of the various projects, from prescribing initial design and development requirements and selecting the development organization, to authorizing specific output products and data-gathering and -processing procedures. Personnel of this directorate are responsible for assuring that all efforts are in consonance with the Master Plans (both ALSC and AFLC) and in harmony with the needs of all interfacing systems.

The Directorate of Operating Systems was charged with maintaining in an up-to-date posture AFLC's current second-generation management information systems, except for some relatively independent systems where development responsibilities have remained with a specific air materiel area.

The Directorate of Advanced Systems was assigned responsibility for design of the new third-generation systems. Manning of this directorate drew systems analysts and programmers from the Operating Systems Directorate. It also brought into the design picture some of the most knowledgeable logisticians from functional areas, in order to realize new dimensions in approaching the task of updating the logistics processes. This directorate also has responsibility for the initial establishment of and continued control over the data base arrangements and data-element contents of the "unified data bank" and special "central data and processing control programs" which are being developed to act as a system control (as contrasted with the AFLC "software"[3] per se, which is for hardware control). This control will consist of special programs for such things as identifying incoming transactions by type, performing basic edits, preparing requests to the software to access needed data from master files, formatting output information for the particular type of remote readout device it will be displayed on or through, purging outdated information, and maintaining statistics on the volume and kind of input/output traffic.

The Directorate of Logistics Simulation and Techniques was established to bridge the gap between the theoretical and its successful implementation in the day-to-day operation. The design of the improved logistics system depends upon the technology advances which are an outgrowth of applied research. We are keenly aware that significant improvements will come as the result of an actively pursued program of research dedicated to logistics. This directorate will draw heavily on the resources of universities, professional societies, and the RAND Corporation, expanding on their work and making it into a functional tool for our purpose. The emphasis will be on management information acquisition, storage, and retrieval and on making computers efficient and responsive devices for controlling the various logistics processes. Our plans call for a laboratory facility to investigate the man/machine relationships, to aid in designing systems.

Simulation has also become an integral part of evaluating the resource requirements and effectiveness of large systems. This capability will enable us to test and modify

decision rules without waiting for actual implementation of a system and a period of operational experience to tell us whether the rules will or will not work as intended. This directorate is also in charge of development of the command software for the new computers and development of an overall communications capability in conjunction with the Advanced Logistics System (ALS).

quantum hardware improvements

As this article is being written, the third-generation ALS hardware has not yet been selected. There are a number of models of computers, remote inquiry stations, and random-access storage devices that could potentially serve the Advanced Logistics System well. Our job is to prepare definitive specifications for the logistics system and equipment, to assist USAF in the evaluation of equipment from the various manufacturers.

Since the birth of the industry, AFLC has been one of the largest users of electronic data-processing equipment in the world. The command received its first stored-program computer in the summer of 1954. And at one time, in the early sixties, AFLC had 53 percent of the entire Department of Defense budget for such equipment. As of July 1968 we were using 129 computers—some that we purchased at a cost of $47.9 million, others that we lease. Our annual hardware maintenance/rental budget is $14.2 million. We employ over 1500 people just in computer operations, located at AFLC headquarters, the five AMA's, the Ground Electronics Engineering Installation Agency (GEEIA), and the Newark Air Force Station in Ohio. Data storage requires over 258,000 tapes.

integrated communications essential

Advances in electronic communications capabilities in the past couple of years indicate a new role and a new emphasis on a communications system that will be integrated with the logistics computer system.

AFLC played a leading role in development of the DOD AUTODIN[4] communications system that now electrically links major supply centers in the U.S. and bases overseas. AUTODIN provides the fastest and most economical electrical transmission of digital data presently available. It uses automatic electronic switching centers that recognize different priorities of messages, provide automatic routing of copies of multiple-address messages, and contain built-in error detection, along with other features. With AUTODIN, however, some base-level and overseas links are still served through manually operated relay stations.

In the current world of data communication, there remains much manual intervention. A substantial burden of data movement—from base to base, base to depot, depot to AFLC, and reverse—is still on military air and mail service, for transmission of magnetic tape files and decks of punched cards. Elimination of all possible manual intervention in the communications process is one of the current major goals of advanced logistics system planners.

Integrated circuits, where dozens of switching elements can be incorporated into a device about the size of a pinhead, have recently been developed. This opens up the possibility of creating, in the decade of the 1970s, reliable miniaturized electronic data communication terminals that can be deployed with tactical forces operating from sites anywhere in the world. These units could interface electronically with a far-flung network of tactical mobile computers, which in turn could communicate electronically with the central AFLC computer complex, by radio signals bounced off orbiting satellites. Geographical distance, for all practical purposes, will be eliminated as an inhibiting factor in communications, and limitations in this field can be largely eliminated as a pacing factor in responsiveness of the entire logistics system.

Planners of the advanced logistics system envision a communications network operating electronically not only at advanced bases, CONUS bases, depots, and the AFLC central complex but also between action points on the same depots and bases.

influence of capabilities on policy

It is precisely these new hardware and communications capabilities that dictate the intensive review of logistics objectives and policies and the management information that will be needed to implement them. This is the "what" of the design problem, and it is influenced or controlled by the logistic policy structure.

The second façet of the design problem of the Advanced Logistics System is concerned with the "how" of its development and implementation. This has to do with resource requirements, application of technology to system design, and time-phasing of the design of the various system segments.

The ideal approach, to ensure a totally integrated system, would be to design the entire system in depth and develop it prior to any implementation. But the entire ALS, as already conceived, is obviously too massive for this approach. In addition, this would be too time-consuming and would prevent us from realizing necessary early benefits.

For these reasons, we chose the alternative: an incremental approach, both to in-depth design/development and to implementation. This requires the development and maintenance of an overall generalized design of the total system. This is being coupled with in-depth design and development of the subsystems chosen for incremental implementation, within the overall framework.

The first increment is to be of sufficient size to realize a high degree of payoff in improvements and at the same time to verify the advanced system concepts.

In defining each increment, we tested the various processes and subprocesses to determine if they met the criteria for early implementation. These criteria include responsive customer support, improved requirements computation, improved product reliability, and increased logistics support from available resources. Other criteria include support of new management concepts for weapon and product management, achievement of an improved data base by providing current and correct data needed to support a Department of Defense-directed requirement, and improvement of overall AFLC effectiveness.

Based on these criteria, subsystems were selected and grouped in five segments to be implemented six months apart, starting in December 1970 and ending in December 1972.

It took ten years to develop the 376 individual data systems now used to support today's logistics efforts. We are investing some 800 people in direct design/analysis/programming tasks (an aggregate of about 3500 man-years) in order to get the entire Advanced Logistics System on the air in slightly under five years, from initial plan to full implementation.

ALS structure and procedures

Here is an overall outline of the broad structure: The advanced logistics system will be designed around a very large block of random-access computer storage—our preliminary estimate is 2,000,000,000 character positions. This will provide the physical facility for the "unified data bank," which will contain complete and current data on each item in the AFLC-managed inventory. This bank of data will range from information elements relating to procurement, supply, maintenance, transportation, and financial matters to special codes used by the Air Force's unique "materiel management" organizations to integrate the relationships of individual items to the various management entities of which they are a part.

Our concept will embrace the technique of recording the various elements of data only once, in the mass on-line storage devices, which will be available to all functional users. This is the concept of the unified data base. It will enable elimination of the estimated 75 percent of redundant information in today's functionally oriented, sequentially processed data systems.

Managers at AFLC, the air materiel areas, and other selected bases will be able to access, and in some cases update, the unified data bank through responsive com-

munication lines. For high-priority items and classes of items, real-time processing of various kinds of actions will be employed to improve the man/system relationship by bringing to managers the capability to obtain current knowledge of worldwide stock levels and asset deployment. For the first time, managers will be able on a real-time basis to optimize support to operational units by equalizing and optimizing the asset deployment. The new system will provide better responsiveness and heretofore unknown flexibility for the logistics process to react to changes in operational plans.

Centralized management control will also centralize computation of base stock levels for selected items, computation and projection of procurement and repair requirements, and distribution and redistribution of assets for the high-priority items. This means that the Advanced Logistics System will make possible reduced pipeline time, faster depot repair cycles, better distribution of our assets, and more accurate and up-to-date overall management visibility. This should enable us to dramatically improve logistics support to the Air Force in a manner that is both cost effective and highly responsive.

differential management capabilities

Another of the basic tenets of the Advanced Logistics System must be a provision to stimulate "differential management" of various items and services.

Some years ago AFLC developed special surveillance procedures for expensive weapon systems components through a program called "Hi-Valu." Items are included in the program strictly on the basis of their high cost. It covers some five percent of the total number of recoverable line items, but these items account for 40 percent of the value of the recoverable inventory, which is placed at $5 billion. These items are bought on an ultra-conservative basis and are subject to special management controls throughout their lifetime.

Another special management tool in AFLC is the "critical item" list. Any item that gets on this list is subject to special management efforts. In the perfect management system the critical item list would, of course, fade away to nothingness for lack of items to place upon it, but this ideal can probably never be realized, in this or any other organization. AFLC management has been aware for a long time that an item or service does not have to be expensive, complex, or big to cause logistic problems. Any kind of component or service may need intensive management surveillance. The trouble is that up to now there have not been either the management techniques or information capabilities to reduce these problems to the minimum.

There can be many reasons for an item or a service to need differential management. One of the tasks of the designers of the ALS will be to systematize causes and methods for differential management techniques wherever they are needed, according to costs, item characteristics, mission, demand rates, asset availability, lead time, application to weapon systems—or any other factor that may dictate a specific management technique.

closed-loop concept

Proper operation of this kind of sophisticated management system demands a "closed loop" concept, to provide for return of information to the manager concerned on the status of any initiated action at the time it is interrogated, or automatically by the system in event a managerial decision is needed. The system will have provisions for return of status information, to indicate that an event or series of events is in or out of control or has been completed.

The classical management control system (Figure 1) illustrates the closed-loop concept. The control segment of the system will be based on standards of performance of many types in all areas of management, from determining the requirements for items to their final disposition. It will devolve upon management to establish the standards; the system will then measure actual performance of all activities against them.

In addition to alerting management to problems, the advanced system will be able to trigger many routine actions where preprogrammed decisions are incorporated into it. Thus, routine or "normal" actions can be accomplished within the system, without any manual intervention, on the basis of previously developed action criteria.

To accomplish such actions, the closed-loop system must have within its design criteria the integration of subprocesses and processes to insure that events required to complete the higher-order process are executed in their proper sequence, without system interruption. At the same time, many events trigger a multiplicity of other events within other processes, and proper interconnection must be made within the system.

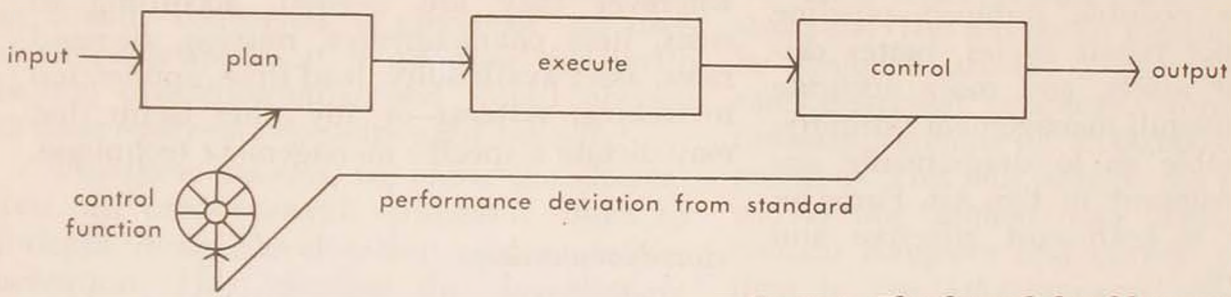


Figure 1. The classical closed-loop management system

There must be various decision points within the system which will automatically direct actions to some other process or to a series of processes, as required. In addition, any transaction or action must be traceable through use of suspense controls and audit trails. If events do not occur according to schedule, or within allowable limits, management will be notified and provided with diagnostic capability to isolate the cause of the problem and determine what corrective action is to be taken.

worldwide assets knowledge

The ALS management methodology is being designed to provide continuously an up-to-date central knowledge of worldwide deployment, condition, and stock level of assets. The important AFLC management goals for this worldwide asset visibility are: (1) to improve compatibility between the requirements and the distribution processes; (2) to improve the validity of the computations for procurement purposes; (3) to obtain a more effective use of depot repair resources through more accurate determination of repair requirements; (4) to optimize redistribution through knowledge of current asset conditions and locations; and (5) to improve the use of long-supply items by causing replacement in lieu of repair.

AFLC systems have already been providing these levels of information for selected items. AFRAMS, as we mentioned earlier, now provides assets and levels knowledge for high-cost reparables and critical items. The AFRANS approach will be extended to more and more items if proper payoff can be obtained.

The advanced logistics system must ensure at all times the maximum effective use of available resources. Toward this end, it is necessary that some method of measuring relative urgency of need be carried through all logistics processes. Priority systems are being developed to ensure that available assets, depot and base repair capacity, and procurement funds are systematically allocated to items and users with greatest need.

management effectiveness evaluation

The urgent need to rapidly extract and condense important management information from the large masses of data flow dictates that the advanced logistics system must provide automated evaluation of support effectiveness. To the maximum extent feasible, the system will provide for automated evaluation of system performance in relation to computed indexes or standards of excellence, for accomplishing the major system activities.

The automated effectiveness evaluation must concentrate on measurements that enhance the capability for forecasting support deficiencies and difficulties in time to permit effective preventive management actions. To permit these timely actions, the system must automatically detect breaches of allowed tolerances in system activity. When such breaches are detected, the system must facilitate rapid follow-up interrogation of the overall data banks to aid in defining necessary corrective management actions.

flexibility/mobility goals

The logistics system of the future must provide the flexibility necessary for transition from peacetime to wartime/emergency conditions and back again effectively, quickly, and easily.

In my opinion, it will be necessary to develop a concept of prepackaged air-transportable supply kits, with self-contained computers for maintenance of files and for furnishing status data to supporting activities, to be employed when feasible. The concept also envisions the use of air-transportable maintenance shops, other support equipment, and related technical libraries.

remaining human factors vital

Application of the advancements in computer and communications capabilities to the future logistics system may only increase the disparity between the time frame of the automated spectrum and that of the human spectrum. To avoid this, re-engineering of the physical demands and processes must take place concurrently with the re-engineering of the automated methodology.

To the greatest extent possible, the present involved physical processes (such as decision-making for which decision rules and/or tables can be constructed, manual preparation of special reports, etc.) must and will be automated.

Meanwhile, the application of human engineering techniques to the remaining human aspects of the system's operation is essential to its optimum performance. Man remains a vital key to the operation of any system, no matter how complex and to what extent automated. Actually, the importance of individual actions and decisions increases in proportion to their effects upon the automated processes.

This is why we must key the human processes to the abilities of individuals at the various levels of system operation. The decisions these personnel will be called upon to make and the data they must input into the automated system must be appropriate for their qualifications and environment.

support as modern as the weapons

To summarize: the current "total approach to logistics systems design" calls for attention to all capabilities (hardware, communications, and human) and for incorporation of the latest management techniques. All these are essential for development by the Advanced Logistics Systems Center of a logistical support capability as advanced, as responsive, and as reliable as the modern weapon systems they will be called upon to support.

To achieve our objectives we must have more aggressive and imaginative planning than ever before, and we must place all possible emphasis on the effective, efficient, and economic exploitation of resources, advanced technology, and management science.

The Advanced Logistics System Master Plan is the result of application of all these ideas and techniques. It outlines a fully automated closed-loop differential-manage-

ment logistics / communications / management system. All processes are integrated to cause timely and concerted interactions and to provide feedback of information not only to all other parts of the system concerned but also to all levels of management having need for the data.

Careful time-phasing of all the actions in the development program, so as to avoid disruption of ongoing logistics processes, is an essential feature of the ALS Master Plan. It provides the blueprint for a logistics system so far ahead of anything now known that, compared with past levels of management improvement over the years, the proposed ALS that will be implemented in the 1970s can without exaggeration be termed a "21st century logistics system." It is one of the most challenging assignments in modern military logistics.

Advanced Logistics Systems Center

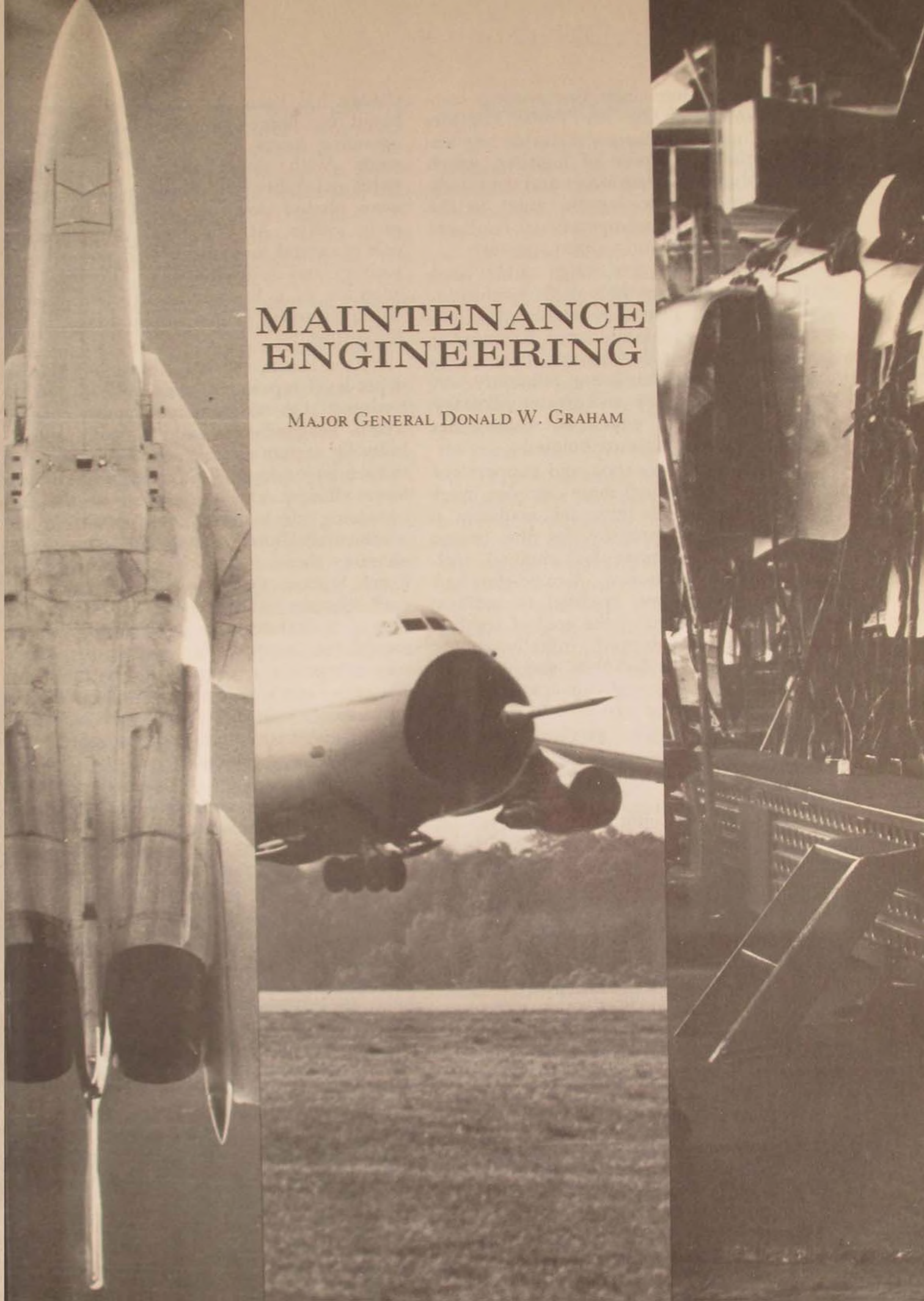
Notes

1. From an address on 6 September 1967 by the late General Thomas P. Gerrity, then Commander, Air Force Logistics Command, before the Los Angeles Chamber of Commerce annual Air Force luncheon.

2. Various authorities differ on definition of the response necessary to comprise a "real-time" system reaction. ALSC, for system design purposes, has defined a real-time response as one that will provide a computer-generated reply within 10 minutes of completion of the inquiry. A response with acceptable delay of up to 30 minutes has been defined as "near real-time."

3. The term "software" has been used frequently in trade circles to refer to all computer programs, including those devoted to a specific application. Within AFLC, however, this term has normally been used to refer to standardized command-authorized routines in use at all computer sites that make up the input/output control system (IOCS) and the interprogram instruction linkage within a system. In the Advanced Logistics System software will include, in addition to IOCS and program linkage, a system of data retrieval routines, increased data-base protection, ability to reassign certain hardware components in event of individual failures, and a system of inquiry-processing priorities. AFLC software also includes the command programs to translate program languages and to sort, merge, copy, and print data files.

4. AUTODIN is the acronym for "AUTOmatic DIgital Network," which operates under the direction of the Department of Defense for the military services jointly. It accepts punched-card input and tape (magnetic and paper) at various terminals and transmits the card image records over leased wires between terminals, through automatic electronic switching centers employing computers that provide priorities of service, automatic routing to coded addresses, etc. Individual transmissions are limited to a maximum of 500 cards or 40,000 characters, as of May 1969.



MAINTENANCE ENGINEERING

MAJOR GENERAL DONALD W. GRAHAM

THE Maintenance Engineering component of the Air Force Logistics Command assumes a sizable segment of the primary purpose of logistics, which is to supply the combat forces and contribute the greatest possible logistic input to the fighting capability and operational readiness of the USAF weapon and support systems.

Beginning with the design of the hardware and progressing through the acquisition and operational phases of its life cycle, the responsibilities of Maintenance Engineering are clearly identifiable. Mission effectiveness, through increased hardware reliability, improved maintainability, and greater efficiency, is the goal toward which all maintenance personnel and practices are pointed.

Today, as our weapon and support systems become more and more complex, work toward perfection in materiel readiness is essential. The opportunity for the human element to compensate for materiel malfunctions has diminished. Around-the-clock readiness has become essential to national defense. Achievement of the goal of combat-capable hardware depends initially on the early program considerations and decisions to build a reliable, easily maintained, and adequately supported air vehicle and associated equipment. The service experience gained on previous weapons must be applied to the design and development of each new succeeding weapon.

Although our efforts are directed in part to the input into design and acquisition, the largest portion of our effort must be expended in the support of inventory weapons. The modification of weapons for increased combat capability, safety, and reliability, as well as the depot-level maintenance of an ever aging inventory, presents a task of formidable proportions.

flexible response and the depot maintenance complex

Modern Air Force depot maintenance is the product of a major reformation in strategic and tactical doctrine that has occurred since World War II. The catalyst for this change has been the search for refinement based on improved responsiveness to the operating forces in a cost-effective environment. With direct support successes of airlift capability, Air Force overseas depots were phased down in the late fifties and early sixties. At this time, the increasing cost of capital investment for depot facilities, tooling, and test equipment prompted the adoption of a bizonal repair concept—with duplicate repair points east and west of the Mississippi.

As a result, the era of specialization in depot-level repair programs evolved and introduced the single-point repair concept which assigned the maintenance responsibility for certain aircraft and weapon systems to each major depot. This concept has proven more efficient and economical at the five remaining air materiel areas (AMA) in the continental United States (CONUS). Supplementing these major depots, Newark Air Force Station, Ohio, and the Military Aircraft Storage and Disposition Center at Davis-Monthan AFB, Arizona, provide specialized support for inertial guidance system repair and aircraft storage problems. The five AMA's and these two specialized maintenance centers constitute the hard-core depot maintenance for the Air Force today.

A labor force of more than 50,000 maintenance personnel provides both technical and physical skill to Air Force hardware problems. During fiscal year 1969, AFLC, with the aid of its maintenance contractors, accomplished some 10,000 aircraft maintenance and modification jobs, 16,000 aircraft engine overhauls, and 2,000,000 lower-level assembly rework jobs generated by major commands.

In addition to the fixed depot facilities, AFLC is responsible for performing major on-site maintenance work, a job that becomes bigger each year. The Southeast Asia (SEA) conflict and its buildup, starting in early 1968, provided the first major test of the AFLC CONUS-oriented depot posture and its heavy reliance on direct support methods. Rapid Area Maintenance (RAM) support provided responsive heavy maintenance assist-

ance on-site for the major repair problems that could not be returned to a CONUS depot. The first call for RAM team assistance in Vietnam came in April 1965. Through its Sacramento Air Materiel Area, McClellan AFB, California, AFLC responded to the urgent PACAF request by dispatching a team of 22 highly specialized aircraft mechanics to repair two crash/battle-damaged F-105s at Tan Son Nhut AB, South Vietnam. The subsequent buildup and major successes of this quick-reaction procedure have demonstrated the effectiveness of the program.

By sending RAM teams into SEA on 24-hour notice, AFLC has added a new and highly advanced dimension to the combat readiness and effectiveness of air power in this remote part of the world. Quite often, RAM teams are working with primitive tools and materials, such as oil drums to replace airplane jacks, fence wire to replace steering cable, and ordinary angle iron to replace the tempered steel interior supports of aircraft. The RAM teams repaired 725 damaged aircraft between 24 April 1965 and 31 January 1969. Aside from the $1.5 billion replacement value of these aircraft which were saved to fly again, it must be noted that many of them were out-of-production and no similar replacement aircraft were available through procurement action. Besides the aircraft repaired, 23 were salvaged for spare parts, 82 were prepared for one-time flight to in-theater contractors, and 99 were readied for shipment to CONUS contractors.

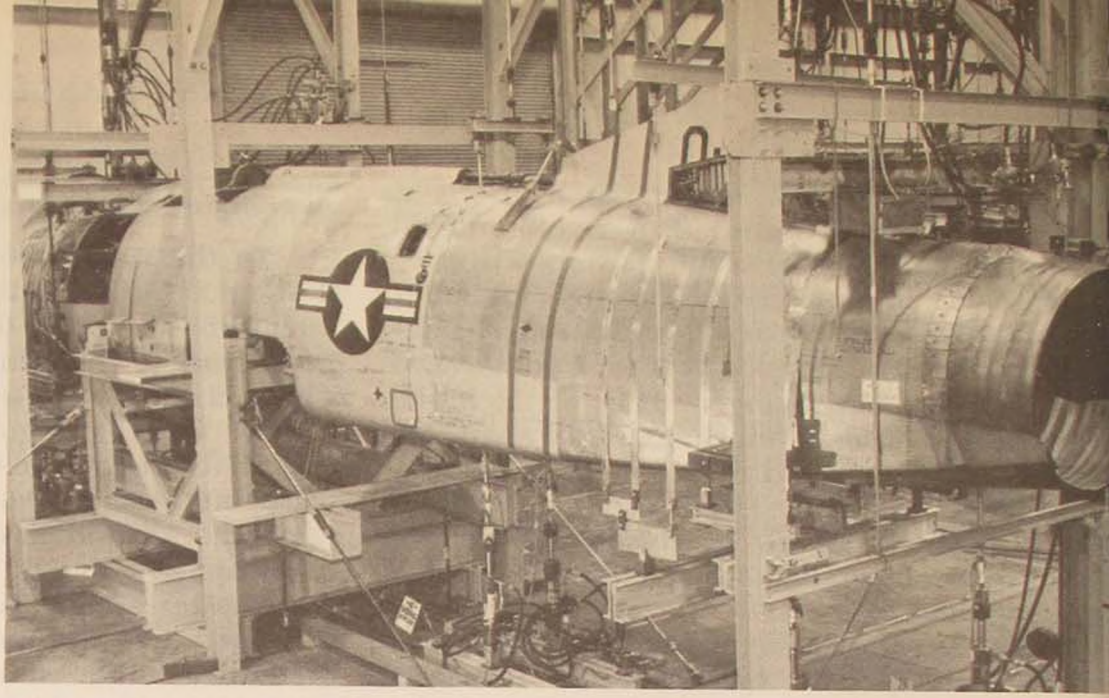
In keeping pace with the current "combat force" environment, AFLC is presently developing an expanded rapid area maintenance on-site capability through organization of permanent combat logistic support squadrons at each AMA. The primary purpose of these units is to provide mobile support-team capability in concert with the mobility/flexibility requirements of the combat commands. It is envisioned that the support teams may be required to deploy concurrently with the major command operating forces, providing enroute support as well as maintenance support within eight hours of arrival at the designated base.

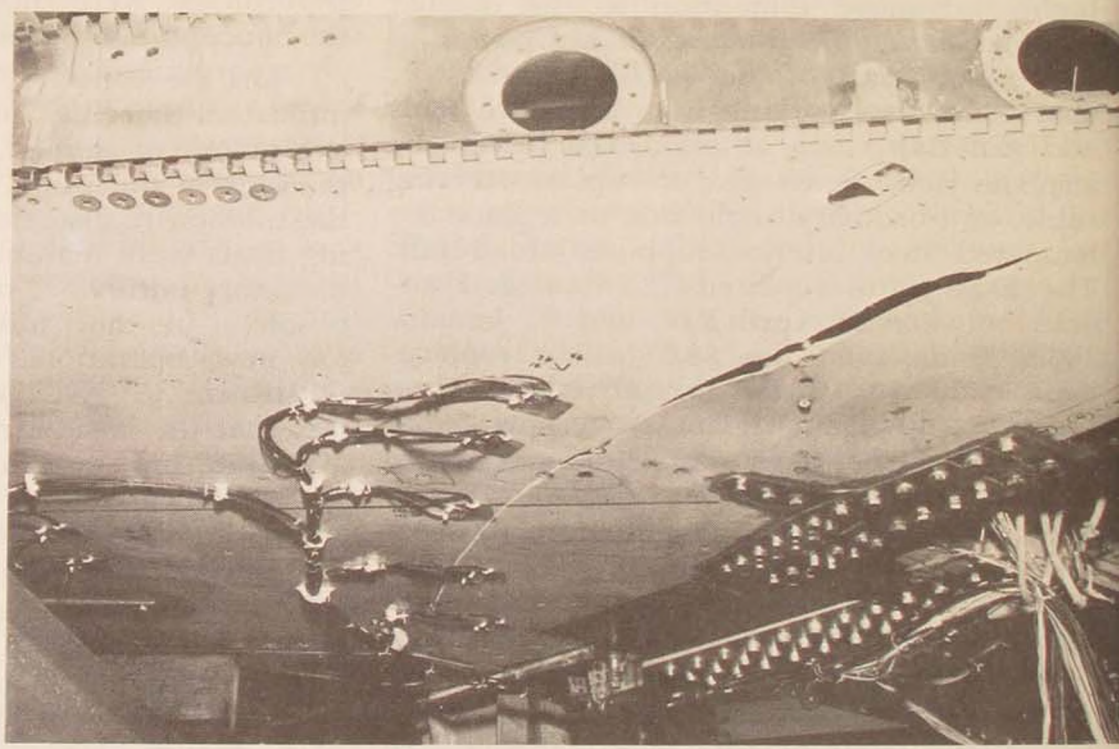
Aircraft Structural Integrity Program (ASIP)

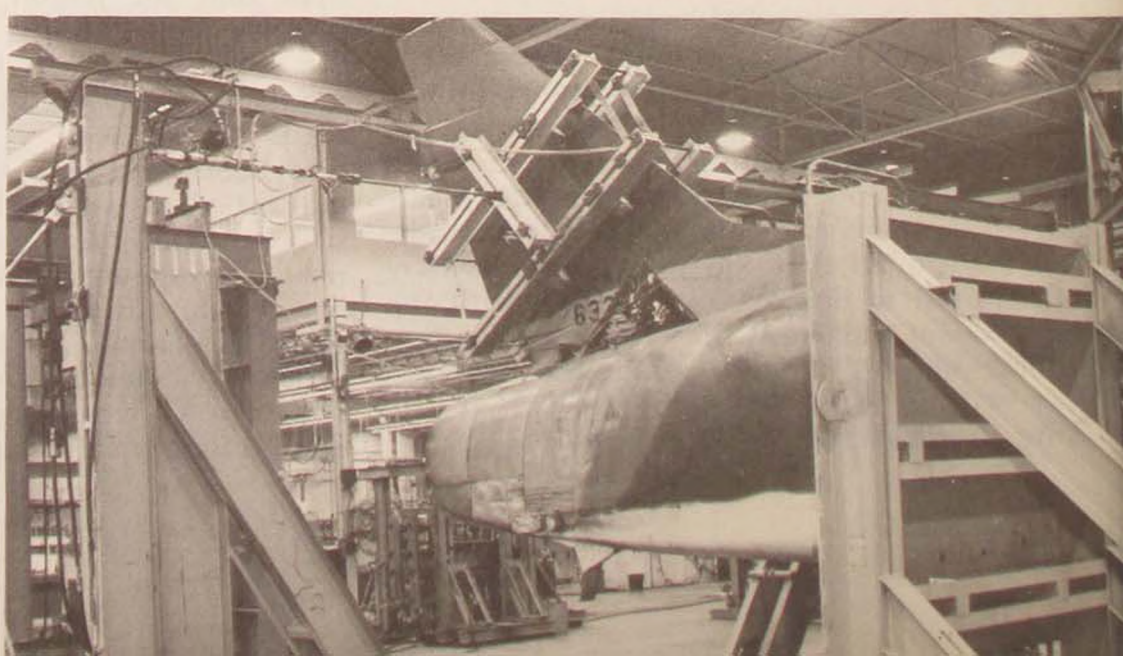
In the past, when an aircraft was being designed for a USAF mission role, special attention was paid to the aspects of safety, performance, reliability, and maintainability. These criteria were assumed to be a function of the basic design, the reasoning being that if the factors of safety and performance were met, then acceptable levels of maintainability and reliability would follow. This philosophy was a reasonable one, since there had been no adverse experience through two world wars and the Korean conflict to indicate that design and development procedures were not adequate to satisfy the conceptual requirements.

On the contrary, operational experience indicated that life limit of the aircraft was a function of normal wear and tear and/or the lack of functional characteristics to meet the mission requirements at hand. The existing fleets were maintained in the operational inventory until worn out or until they became obsolete in the "force structure" planning for new operational concepts. There was no reason to give positive thought to the fact that the basic airframe itself might have a definite life limit—a point at which it was no longer capable of the performance characteristics to which it was designed.

In the late fifties a new concept for employment of the strategic air arm of the USAF required that a modern (for that time) high-performance bomber fleet be operated in a mission environment far more severe than that for which it was designed. The severity was not in taxing the strength of the structure but in the combination of the number and magnitude of maneuver and gust loads experienced. The end result of this new fleet usage was the first of a number of failures that were identified as caused by structural fatigue. This mode of failure is a result of repeatedly stressing a structure (by maneuver, gusts, and ground loads) until a crack develops. Additional cycles of stress cause the crack to grow until the remaining structure is weakened to the point that it can no longer safely carry normal operational







The Aircraft Structural Integrity Program (ASIP), developed by Air Force Systems Command and Air Force Logistics Command, is a six-phase program for detecting structural fatigue in time to make remedial modifications or timely phase-out. F-100s are subjected to rigid fatigue tests of the fuselage (top) . . . of the wing (center), resulting in a long skin crack . . . and the vertical stabilizer fin.

loads. This experience provided the impetus to develop a systematic sequence of procedures for structural verification under any operational concept.

In addition to the safety and performance aspects, these failures had a significant impact on maintenance requirements in terms of man-hours and dollars. It is incumbent upon AFLC to provide the most advantageous combination of organic and contract-augmented maintenance capability to meet any military contingency—to have sufficient capacity and flexibility to respond to any requirements without compromise or disruption of normal inspection and repair as necessary (IRAN) and depot maintenance schedules. Since structural modification/repair of load-carrying skin or major structural members requires hundreds of man-hours per aircraft, special skills, equipment, and depot-quality facilities, it is not sufficient to know just the design goals. Of more importance, an accurate measure of total structural limitations must be available to determine *where* and *when* the weak parts will make themselves known, so that adequate long-term planning can be accomplished to lessen the impact on maintenance resources and still insure safety and operational capability.

Although effort was brought to bear on the problem of developing procedures and techniques for assessing the fatigue life of structures in the late fifties, budgetary constraints and the normal time cycle of technological development precluded rapid progress. An aircraft structural integrity program, outlining the basic steps for design, development, test, and monitoring, had been developed. However, implementation of the program was primarily accomplished piecemeal on older aircraft requiring life extension and structural update.

The advent of the Vietnam conflict brought the full impact of safety, operational, and logistics problems related to structural fatigue. In an effort to force existing aircraft to meet the particular needs of this environment, we have worked, reworked, reclaimed, and redesignated old aircraft for new roles that would stretch the imagination. A cargo aircraft of the 1930 vintage was pressed into service as an airborne close support gun platform; a large fighter-bomber fleet was extended in a prime tactical mission role for twenty years (7000 hours' operational life) and beyond; the operation of high-altitude, high-speed strategic bombers at treetop level became standard operational technique —all these and more adaptations have taken place. However, the price was paid in accelerated structural fatigue which resulted in catastrophic or mission-limiting fatigue failures.

The B-47, B-52, C-130, A-1, F-100, and others have experienced fatigue failures, only the B-47 and B-52 having had such failures prior to Vietnam. The failures were chargeable primarily to one or both of two causes: (1) fatigue considerations in designing the system had not contemplated the severity of the utilization; and/or (2) the extended use to meet operational requirements had taken the airframe beyond its basic fatigue life. The vast majority of the older aircraft fall into one or both of these categories; consequently, we can expect more structural fatigue problems to appear on these aircraft in the future. Unfortunately, there are limits to the degree of structural assessment that can be performed on these aircraft. Lack of data on past mission utilization and operational environment precludes an accurate life determination regardless of the effort expended in testing analysis.

Structural fatigue problems are not limited to old aircraft but are also prevalent in the new and relatively new aircraft. Fatigue damage is a function of the magnitude and number of stress levels experienced by the airframe while flying in its operational environment. High utilization rates in severe environments can rapidly use up the fatigue life of a structure even though it is considered relatively new in terms of calendar time. Ironically, the fatigue problems have been aggravated by improvements in design technology for static strength. Structures can now be designed more efficiently from the static strength viewpoint with resultant higher

working stress levels. This results in higher fatigue damage rates and a shorter fatigue life. Furthermore, the more efficient design may narrow the band of allowable error in fatigue life prediction, since less conservatism is introduced in the design to allow for unknowns. In conjunction with all the other complicating factors, today's aircraft are required to perform a variety of missions in a variety of environments, each of which must be assessed in terms of impact on fatigue life.

Faced with the knowledge that structural fatigue and its implications are here to stay, the Air Force Systems Command and AFLC have jointly developed a sequence of events and procedural steps constituting a definite program, Aircraft Structural Integrity Program (ASIP). Phases I through IV of the program follow the same sequence of events that the structural development of any piece of equipment would follow: Phase I — establish what the equipment is to do and the design criteria, and then build it; II — test to prove design analysis, i.e., test of loads and unit tests of flutter, stress, fatigue, and sonic analyses; III — testing of flight and ground flutter, flight load survey and dynamic response, and full-scale static, fatigue, and sonic tests; IV — final structural integrity analysis, including strength summary and operational limits of the equipment, service life prediction and inspection report, and parametric study.

Since the fatigue life of the structure is affected by aircraft utilization, the next phase, Phase V, is based on actual operational usage. This phase provides two basic inputs, which are used to monitor the life of each critical area on each aircraft continually. First, flight recorders are installed on a percentage of the fleet. These instruments record the parameters required to describe statistically the environment in which the aircraft are flying. For example, they record the magnitude and frequency of gusts experienced, which are much greater during low-level flight than at high altitudes. Next, a flight log is recorded for each mission that an airplane performs, describing the type of mission, velocities and altitudes, gross weight, aircraft configuration, etc. The recorder information is used to update continually the fatigue analyses, and the flight logs are used to monitor the life of individual aircraft via a simplified approach called a parametric fatigue analysis.

A greatly simplified graphic representation of Phase V is shown in Figure 1. The leg down the right side of the figure represents Phases I through IV, while the operational requirements of Phase V, based on mission records and airborne recorder sampling, are presented by the left and center legs. The computer output represents the fatigue life reports and inspection/modification requirements. Phase VI, the inspection phase, provides a means to assess the unpredictable effects of corrosion, abrasion, and normal wear. It also affords the opportunity to check the critical areas for fatigue cracks and supplement the analytical prediction. This phase is both the end function of the total program and the pivot point for feedback of operational conditions that may influence or modify the analytical findings of Phases I through V.

The implementation of ASIP on new aircraft will provide the information required to ensure structural integrity and to schedule required modifications well into the future. It will provide the force structure planners with a guide for including structural life as a consideration in phasing out aircraft and in defining new aircraft procurement requirements.

All the older aircraft have been reviewed and grouped in five categories, reflecting the feasibility and requirements for conducting ASIP on a fleet. The categories range from the first, containing those aircraft to which the total program can or will be applied, down to the fifth category, which includes those aircraft having so few of the ASIP elements accomplished that no analytical determination can be made of their structural status. There are aircraft fleets that, even though relatively old, are being tested and evaluated for structural modification and update to fulfill an urgent need. However, for

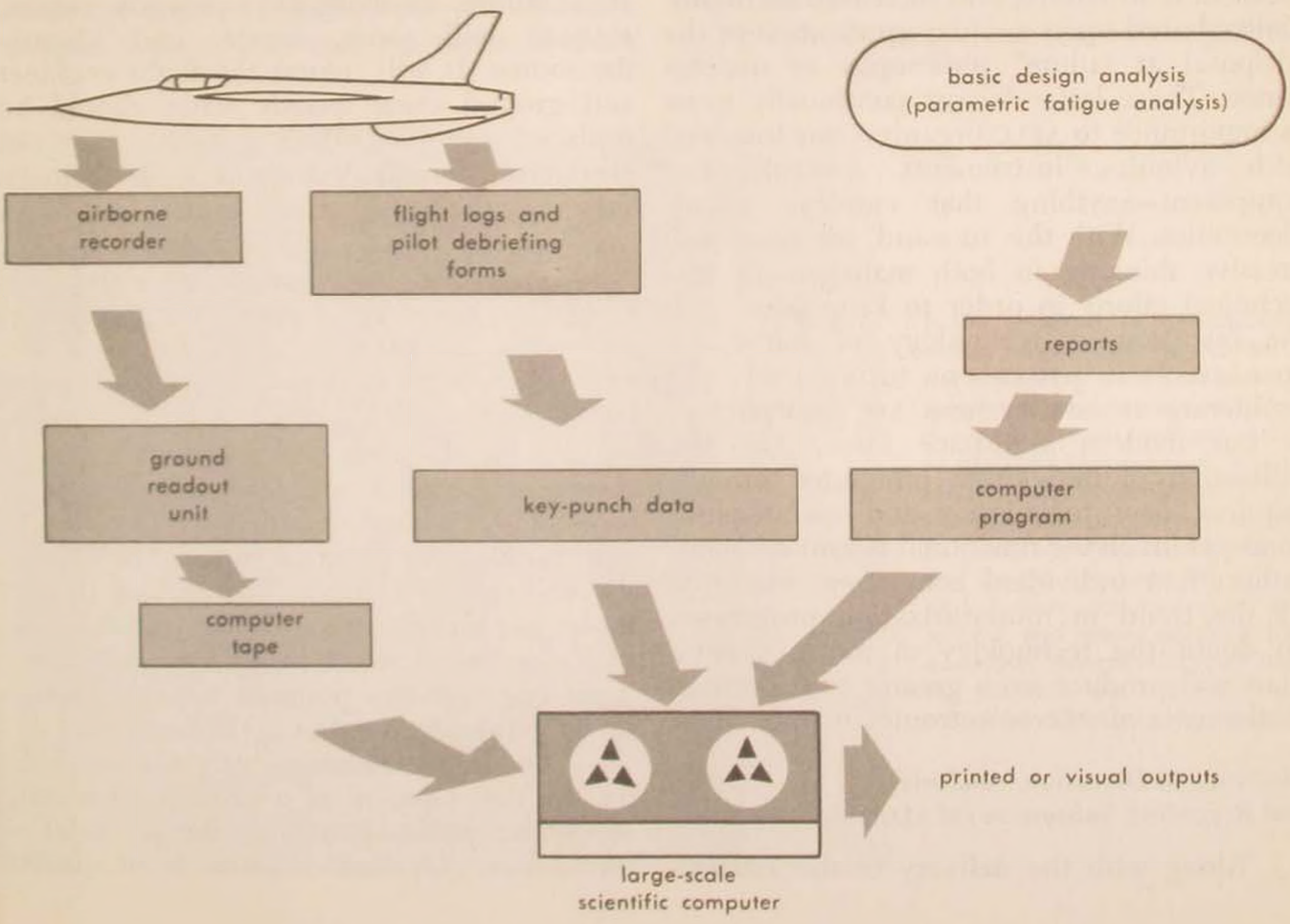
most of the older aircraft, the economic considerations in duplicating the requirements of the first four phases far outweigh all but the most urgent operational needs. Except for a small number of select, relatively new aircraft, current operational fleets will not have the ASIP accomplished; instead, structural status monitoring will be accomplished primarily by inspection. Recognizing that such widely varying technical backgrounds and utilization histories do exist in current operational fleets, AFLC is pursuing structural integrity programs only where the technical feasibility can be fully supported and justified on a cost-effective basis.

microelectronics maintenance concepts

The miniaturization trend began with development and use of the transistor and the solid state diode. To conserve space and improve maintenance and reliability, more compact and reliable electronic circuits were built. These devices have proven effective so that the weight of some airborne electronic systems has been decreased as much as 50 percent during the first generation of transitorized equipment. The continuing reduction in volume has made it possible for the computer to become airborne.

In the early sixties the development of solid state devices reached the point where

Figure 1. Phase V of Aircraft Structural Integrity Program



integrated circuits became a reality—hence new horizons were in sight. The integrated circuit permitted a breakthrough from miniaturization to microminiaturization, "microelectronics" as it is now termed. This latter technology promises an almost unbelievable reduction in size and weight, an increase in reliability, and a reduction in lifetime costs (initial equipment cost plus cost of maintenance in an operating environment). Military equipment with integrated circuits is being deployed in operational environments on a rising scale. Plans are under way to replace certain older equipment with sets that contain 70 to 90 percent microelectronics. TACAN and UHF communications are examples of planned replacement; LORAN C and D are newly developed systems with integrated circuits.

The advantages of microelectronics are many. In addition to decreases in weight and size, reduced needs for cooling and power are important. Benefits to the Air Force include greater reliability in terms of longer mean time to failure, and increased maintainability based upon a wider application of the "disposal at failure" philosophy of maintenance. These latter factors continually grow in importance to AFLC organizations involved with avionics, instruments, controls, test equipment—anything that employs microelectronics. With this in mind, we need progressive thinking in both management and technical efforts in order to keep pace with the fast-growing technology of microelectronics. It is prevalent today and will proliferate as new systems are incorporated in our modern aerospace force. The full utilization of monolithic integrated circuits requires new techniques and maintenance concepts involving functional circuit elements rather than individual component circuitry. As the trend in miniaturization progresses, no doubt the technology of future generations will produce even greater contributions in the area of microelectronics maintenance.

Malfunction Detection, Analysis and Recording Subsystem (MADARS)

Along with the delivery of the 720,000-lb-plus C-5A into the Air Force inventory comes a sophisticated performance monitoring system. The C-5A will feed a constant stream of complaints and assurances to its aircrew and thus give its pilot a degree of decision never before attained by an aircraft commander. Upon landing, it will provide the ground crew a complete report on its functioning status, pointing out whatever weaknesses exist and possible solutions for them. At the same time it will provide a package of tapes, which will be fed to a computer complex, to be used in conjunction with the immediate readouts to build a current history of the aircraft, identify failed components, and pave the way for a swift, responsive, and economical operational control.

The heart of this monitoring system is a collection of electronics, wires, and controls called Malfunction Detection, Analysis and Recording Subsystem, or MADARS. The unit will monitor the performance of selected aircraft subsystems continuously during flight. If a failure or marginal operation occurs, MADARS will sense, locate, and identify the source. It will inform the flight engineer and ground crew exactly what should be replaced and how. With a healthy, built-in skepticism, it will first check itself to make sure that the event sensed is real and not a malfunction of MADARS components. The system will scan and monitor more than 900 test points covering almost 1700 line replaceable units, and do most of this automatically. MADARS can also monitor some of these components on demand of the flight engineer.

For a diagnostic check during flight, the flight engineer will receive a live wave form on a scope. At the same time the MADARS will furnish comparative wave forms from its random-access memory bank and project these onto an adjacent screen. By comparison and progressive selection of wave forms, the flight engineer can pinpoint the malfunction down to the part number of the faulty unit.

The implementation of MADARS calls for the development of a ground processing segment capable of meeting the potential of the airborne system. MADARS is unique to

the C-5A; the aircraft was designed and built to interface with such a system. This alone makes comparisons with other aircraft difficult; and since a MADARS-less C-5A does not exist, even this comparison is impossible. Whatever its potential, the self-seeking troubleshooting system is going to be only as effective as electronics, design, experience, and know-how can make it.

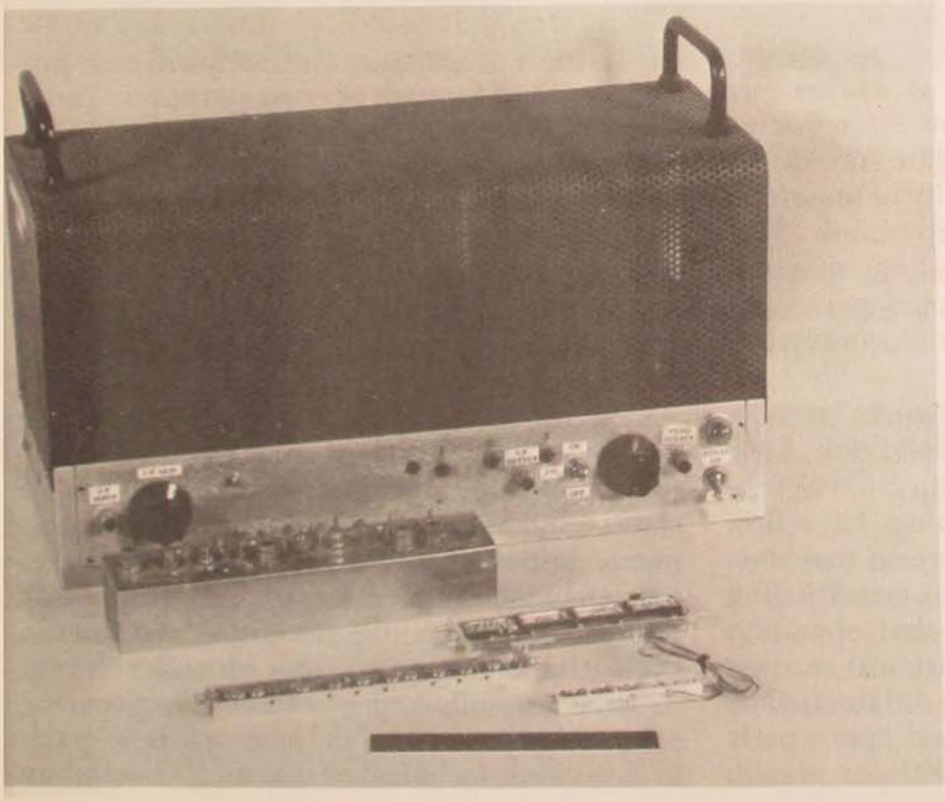
Increase Reliability of Operational Systems (IROS)

In a sense an IROS program has existed since the first caveman worried about the reliability of his club. As systems became more complex, more expensive, and functionally more interdependent, the proportion of total cost-of-ownership represented by logistics maintenance support grew. The Air Force management realized that spares and maintenance required to keep these sophisticated systems working were a significant drain on its resources. The logistics support costs currently are nearly $17 billion per year. Today's weapon systems may cost ten times as much for support during their life cycle as their acquisition cost.

The basic concept of IROS is to reduce this cost-of-ownership by discovering the most effective actions that can be taken to reduce postacquisition maintenance costs. If the reliability of a system can be improved, the maintenance costs and spares required to provide a given level of combat readiness will be reduced.

The IROS program involves a continual search of the Air Force inventory for items that consume disproportionate resources because of their high failure rates or lack of maintainability. Once such items are pinpointed, changes are sought which will pay back their implementation cost by reduction in maintenance or spares within two years. These changes can involve anything from a simple alteration of procedures to a major weapon system modification. Thus IROS provides a sound business basis for improvements that are not necessarily justifiable on the grounds of safety or mission essentiality.

It sounds simple enough, but in practice



Rapid progress in miniaturizing military equipment is evident in the reduction from the vacuum-tube receiver component (top), common to most military radars, to the 1965 "breadboard" transistorized version (under it) . . . to the first microelectronic version, in 1966, with equal performance and longer life (next below) . . . and further reductions in size, weight, and power needs in 1967 and 1968 integrated-circuit models (nearest the 12-inch rule), which are 200 times more reliable.

it really is not. Consider the implications inherent in the IROS philosophy. To find items that are consuming excessive maintenance or causing excessive downtime, it follows that the item-by-item health must be known or obtainable. It also follows that the costs and the time to repair must be known. Even when an item's failure rate, time to repair, parts cost, spares cost, etc., are known, the influence on total system reliability, changes which may improve it, costs of the changes, and amount of improvement must be determined. When one contemplates the size of the Air Force inventory and the fact that our worldwide maintenance management system (AFM 66-1) is pouring in reports of almost five million equipment failures and unscheduled maintenance actions every month, he senses the behemoth proportions of the task.

The IROS program approaches the problem by what might be termed the "squeaky wheel" method. Failure rate, abort, and maintenance man-hour data supplied from all sources are scanned for trouble spots. Each air materiel area maintains and reports on a list of ten low-reliability items under its cognizance. This continually updated report zeroes in on items that are consuming excessive unscheduled maintenance or causing high abort rates or system downtime. In addition, Deep Look Task Groups are formed as directed by AFLC to investigate intensively the reliability and maintainability of important weapon systems. These Deep Look Task Groups are chaired by the system manager and participated in by all affected personnel, including AFSC personnel and contractors as appropriate.

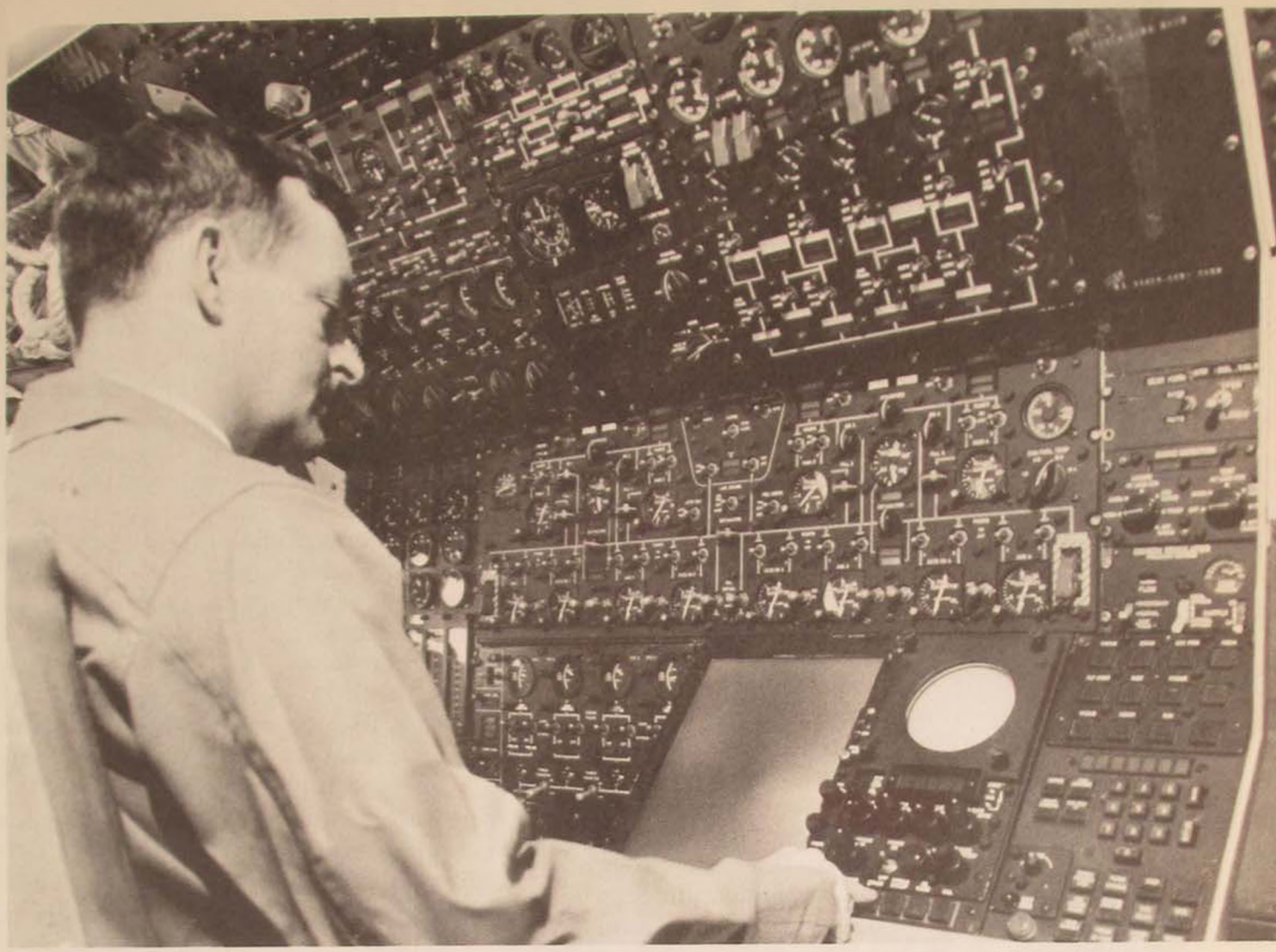
An example of how IROS works may be of interest. The KC-135 Deep Look Task Group noted that AFM 66-1 data from Southeast Asia bases were beginning to reflect high failure rates for the air cycle machine, which is part of the KC-135 air-conditioning system. Investigation revealed that operation at low altitude and high humidity was causing icing on the machine's turbine. Maintenance to repair the failed turbines and spare parts was found to be costing $163,000 per month. The Deep Look Task Group engineers, working closely with the contractor, arrived at a simple fix: a small amount of warm air ducted to the turbine inlet eliminated the icing. The cost of the fleet-wide modification was $75,000. Thus it qualified under IROS criteria because it paid for itself in just 2.2 months. The engineering change proposed (ECP) was approved 24 January 1968, and the modification will be completed by September 1969.

Results so far indicate the IROS program is sound and the dollar savings real. For instance, in the example given, reports from Southeast Asia indicate that 52 modified machines have operated an average of 844 hours without a single failure reported yet.

improvement of modification management procedures

In scope, the Air Force modification program directly involves all functional areas of AFLC and all maintenance and operations functions of the tactical, strategic, and defense forces. In varying ways each of these organizational entities has developed modification procedures designed to meet its individual needs. One universal procedure is not necessarily the answer, but the many diverse procedures tend to work at cross purposes. Today everyone seems to be in the "mod" business, particularly in the accomplishment phase, and in this regard the approved modifications on-the-books in terms of man-hours are approaching 30,000,000.

This man-hour figure indicates the magnitude of the deficiencies requiring correction as well as the new capabilities being added to the aircraft and missile fleets, the ground communications and electronics systems, and related supporting equipment. The size of this endeavor, coupled with the economic and response-time constraints, makes efficiency the order of the day. Properly addressed, this includes the entire modification cycle, beginning with the identification of deficiencies, followed by the best engineering solutions, the timely delivery of new parts or kits and technical data, and concluding



A C-5A flight engineer uses the manual mode to pinpoint a problem on the Malfunction Detection, Analysis and Recording Subsystem, called MADARS, of the sophisticated new 720,000-pound aircraft.

with the optimum method of implementing the fix.

These integral phases of modification development and management were studied in depth during the last half of fiscal year 1968. Ideas and recommendations were solicited and received from a comprehensive sample of the organizations directly involved in the "mod" business. These led to many "brainstorming" sessions and detailed discussions, which resulted in a series of meaningful concepts and recommendations. The majority of these recommendations received Air Force approval and will be implemented progressively over the next several years. A synopsis of the major changes will help to see the road ahead.

The most fundamental of these new approaches is the simultaneous accomplishment of all depot and field-level Time Compliance Technical Orders (TCTO's) when the aircraft or equipment is cycled through an AFLC facility for depot maintenance. The objective here is to accomplish modifications in the shortest time possible and by the most economical method. This is referred to as a "max mod loading" concept: when an item is disassembled for repair, all outstanding TCTO's will be accomplished concurrently, thereby reducing the number of individual

access and button-up actions. In the case of aircraft, this includes the engines and all other installed equipment in addition to the airframe items. In the area of noninstalled equipment such as spare engines, which may recycle only every four years or more, AFLC must provide field teams to accomplish these mods or else force-generate (recall) the engines if depot facilities are necessary.

Tailoring the designated level of accomplishment to the capabilities of the individual command will be handled by establishing specific clock-hour and man-hour limits for each aircraft and each command. This will preclude excessive buildup of workload at base level, which either delays incorporation or adversely affects operational needs. This criterion has been tested on selected aircraft such as the B-52 and C-141, and Hq USAF has now authorized implementation Air Force-wide. An example for the future is the C-5A, which is pegged at 16 clock-hours or 48 man-hours. Accordingly, if work requirements for any future TCTO exceed either of these figures, the TCTO would be designated for "depot-level accomplishment" as opposed to completion at base level.

Several changes will be made to improve control and distribution of modification kits. The first major change will be the elimination of automatic kit distribution. The recipient organizations will be required to determine their specific needs and requisition the quantity required to meet them. Also, kit monitors will be established at the headquarters of each major command to determine and verify base-level priorities for receipt of kits. These command monitors will work directly with the AFLC air materiel area kit monitors. When a requisition is received, the initiating unit will be checked against the priority list for honoring or delaying the request.

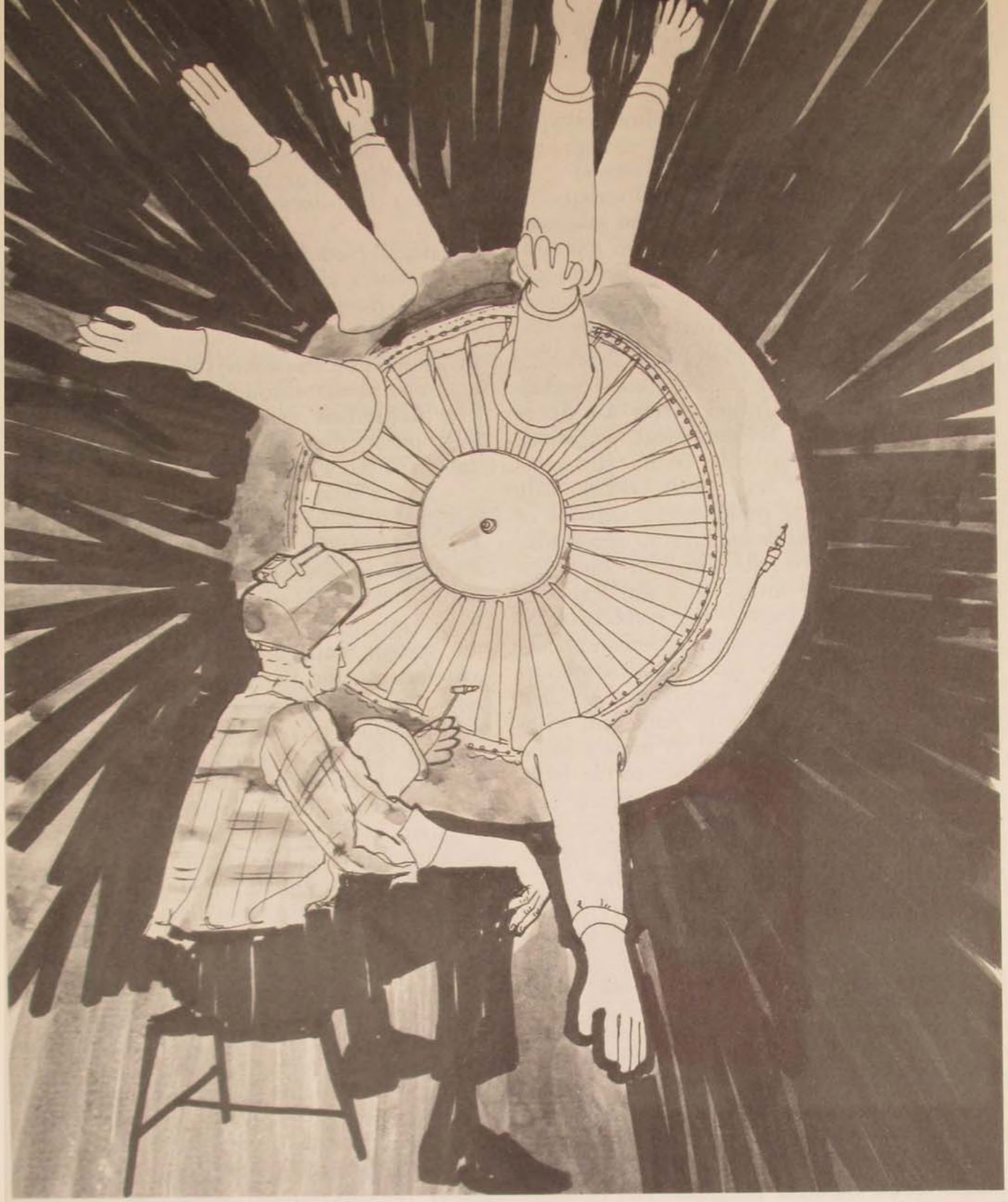
In support of the "max mod loading" concept, major IRAN and modification facilities will be provided a 30-day supply of field-level TCTO kits, thus ensuring effective depot compliance. Separate release of individual TCTO's is being curtailed also. In the future all "mods" in process will be considered, and an optimum package will be developed for simultaneous release and concurrent accomplishment either at time of depot overhaul or repair at base level. This will reduce the unnecessary man-hours to perform individual modifications requiring multiple disassembly and reassembly of the same components. This series of procedural changes is designed to put the right "mod" kit at the right place at the right time and to reduce the incidence of lost kits, redistribution actions, and overall inadequate modification support.

Better air materiel area planning and management of modifications constitute another area program which is being improved. Functional responsibilities of our technical and production people have been changed to stress control and single-point management of all phases of the modification program. Many problems existing today are due to inadequate communication among the parties involved. In the future the system managers will conduct periodic planning meetings during each year with representatives from the AFLC engine managers and applicable commands. These meetings will be the basis for reviewing forthcoming modification workloads and packaging requirements and for evaluating progress on previously released workloads.

The need for additional study efforts is also recognized. As an example, a project has been assigned to Sacramento AMA to evaluate and develop cost-effectiveness studies on a proposal advanced by Tactical Air Command for aircraft modification and modernization on an annual basis. Other imaginative new ideas are being sought and will be pursued to ensure that all possible efforts are made to meet the demands of the hardware users on a cost-effective basis.

In the future, we of Air Force Logistics Command will continue to anticipate trends and respond quickly and flexibly to worldwide peacetime operations while supporting the national defense posture for any possible future contingency. In addition, Maintenance Engineering will be striving for increased hardware reliability, improved maintainability, and greater effectiveness and efficiency no matter what the requirements may be.

Hq Air Force Logistics Command



Welding the titanium inlet guide vanes of a modern jet engine must be done inside a plastic bag of inert gas, such as argon, which must also be free of impurities that could cause a brittle weld. The eight access arms facilitate approaching the job from various positions.

INNOVATIONS WITHIN AFLC

MAJOR GENERAL FRED J. ASCANI

THE Air Force Logistics Command recognizes that the continued superiority of the United States Air Force depends upon the technological, logistical, and operational capability of its personnel and materiel. The AFLC must continuously assume a posture of performance capable of satisfying the demands for logistic superiority inherent in the aerospace forces in-being, the next generation of forces, and the forces of the future. AFLC must be responsive to the critical and urgent logistic demands necessary to maintain the operational superiority of the forces in-being serving the national interests both in Southeast Asia and elsewhere throughout the world. It must also be responsive to the logistic impact of the technologically superior advanced weapon systems and materiel currently in the conceptual or acquisition phase. These demands define the context of the AFLC mission of today.

The AFLC Deputy Chief of Staff, Operations, has implemented significant innovations within the command to insure the logistic superiority of the current and future aerospace forces.

system manager program

One of the most significant developments in the area of logistics management was the implementation in November 1967 of the AFLC system manager program. The continuing shortage of research, development, and acquisition dollars made it mandatory that increased emphasis be placed upon the reliability and logistic supportability of current Air Force systems and associated subsystems. To achieve this objective, action was taken to develop a program that would improve the management of all logistic aspects of major Air Force systems, subsystems, projects, and end items throughout their life cycle. The individual designated to perform this function is the system manager, popularly known as "crew chief."

At the time Air Force Systems Command designates a system program director, the AFLC commander makes a provisional system management assignment for that system to one of the five air materiel area commanders. The AMA commander, in turn, designates the system manager. Concurrent with these assignments, the Directorate of Weapon System Program Management, Headquarters AFLC, assumes program management for support of the system and prepares a program management directive to provide guidance and direction to the system manager. The program management directive is designed to implement preacquisition logistic actions and establish the plan for support of the system during its operational life.

The system manager has total logistics responsibility for the system he manages. In the early part of the system's life cycle, he influences system design by providing logistic intelligence and constraints to the developing agency. During the contract definition phase he ensures that the logistic requirements are built into the acquisition contract. During the acquisition phase he ensures the satisfaction of all logistic requirements. As the system enters the operational phase, he maintains constant surveillance over the system to improve the basic design and ensure that the way the using activity operates and maintains the system is consistent with the capabilities of the equipment.

The system manager must essentially be a highly experienced and extremely competent organizer, manager, and integrator,

fitting all the complex parts of the logistics picture together on a timely basis in a concerted effort toward meeting the requirements and maximizing the operational readiness of the customer.

He is not bound by arbitrary limitations on the scope of his activities; instead he is expected to move out aggressively into any area affecting his system. In dealing with other Air Force activities, other government agencies, and contractors, he speaks with the authority of the AFLC commander. The responsibility of the system manager ceases only when the Air Force is relieved of its logistic responsibility for the system.

The early assignment of system management responsibilities has become a policy of AFLC and has been incorporated into applicable directives and regulations.

weapon system liaison officers

A weapon system liaison officer serves as an on-the-spot representative of the system manager. He is familiar with the logistics procedures essential in obtaining rapid responsiveness, in obtaining a critical part for repair of the aircraft or other system, in obtaining emergency technical assistance, in anticipating logistic problems, and in initiating remedial action. Individual weapon system liaison officer requirements are reviewed once a year to determine the need for their continuance. When it has been determined jointly by the using command and AFLC that the specialized support is no longer needed at a particular base, the weapon system liaison officer is returned to his parent air materiel area.

special logistics assistance to Southeast Asia

In the autumn of 1965, a group of logistics specialists was assembled from within the AFLC staff to form an organization under the DCS/Operations called the Logistics Activation Task Force. This group was charged with development of a Southeast Asia (SEA) buildup programming plan and for management of the aggregation of "packages" of supplies and equipment required to establish and operate complete air bases.

Teams of supply, maintenance, and transportation specialists were assembled to provide on-base assistance and training at the SEA bases. They provided escort for the base packages and supervision of the unloading, storage, installation, and checkout of the supplies and equipment. So important were these teams to the overall support of the SEA operations that logistic teams have been expanded to provide continuing depot-level support and assistance as requested.

The supply specialists, known as rapid area supply support teams, are engaged in inventory and rewarehousing to eliminate excesses, consolidate locations, and provide more efficient use of limited storage space. The transportation specialists, known as rapid area transportation support teams, frequently work in conjunction with the rapid area supply support teams to pack and crate excesses, inspect storage containers, arrange shipping schedules, and eliminate receiving backlog. Crash and battle damage in Southeast Asia constitutes a major part of AFLC maintenance support work, accomplished by the rapid area maintenance teams. Work in this area includes assessment of damages determination of repair source and accomplishment of depot-level repair. Team assignments are usually from 60 to 120 days and normally two or more teams are programmed for arrival at the same time.

To maintain a close working relationship with the using commands in Southeast Asia and provide the best possible support, liaison officers have been assigned to the Thirteenth Air Force at Clark Air Base, Philippines, and the Seventh Air Force at Tan Son Nhut Air Base, South Vietnam. The duties of these officers are to provide on-the-spot support assistance to the weapon system liaison officers and AFLC assistance teams keep AFLC informed of support deficiencies, and plan ways to facilitate rapid reaction to changing requirements.

The AFLC commander has assigned a special assistant to provide on-site direction of the AFLC response to SEA logistics require-

ments. Located at Seventh Air Force headquarters, he provides overall supervision of AFLC rapid area maintenance, rapid area supply support, and rapid area transportation support teams and liaison personnel to ensure that timely support is provided. He advises and assists the commanders and directors of materiel at the Thirteenth and Seventh Air Forces. He keeps the AFLC and AMA commanders advised of support deficiencies and follows through to ensure response and corrective action. With the unique operational relationship between the Seventh and Thirteenth Air Forces, the creation of this position has been highly beneficial in providing a single point of contact in Southeast Asia for all AFLC logistic problems.

management of C-E-M

Management of the installation engineering, equipment procurement and installation, and logistic support of communications-electronics-meteorological programs directed to AFLC for implementation is accomplished by utilizing various techniques and management tools.

Upon receipt of a communications-electronics implementation directive from the Air Staff, AFLC publishes a program directive. This directive places specific responsibilities upon the AFLC activities involved, including the Ground Electronics Engineering Installation Agency (GEEIA) and the appropriate AMA'S. The directive also establishes target dates for each of the milestones that must be attained by the forecast support date. These milestones are entered in the AFLC Communications-Electronics-Meteorological Program Milestones Status Report, commonly referred to as the H-17 report.

C-E-M Program Milestones Status Report

The H-17 report serves as the basic internal AFLC management tool for displaying the current status of all communications-electronics-meteorological programs directed to AFLC for implementation. One of the significant features of the H-17 requires the responsible activity to submit a summary for each milestone that cannot be met, describing the problem, the pacing item creating the problem, and the estimated get-well date. The H-17 system serves as a valuable management tool not only to ascertain current program status but also to provide information relative to the difficulties being encountered, the resolution techniques, and the new completion dates.

Project Pacer Pick

Prior to the conflict in Southeast Asia, communications-electronics requirements were programmed in accordance with AF Manual 100-18, *USAF Ground Communications-Electronics Program Management.* Briefly, this manual requires the operating commands to prepare and obtain approval of a communications-electronics implementation plan from Hq USAF before any action is taken to satisfy the requirement. The process is time-consuming and not responsive to wartime conditions.

To combat this situation, a "streamlined communications - electronics - meteorological programming procedure for Southeast Asia" was developed. The resultant Project Pacer Pick is divided into two parts:

a. Pacer Pick I requirements are reviewed, approved, and funded and immediate procurement action is started during requirement meetings called semiannually or at the discretion of Hq Pacific Air Forces. This on-the-spot approval enables AFLC to release available items for immediate shipment.

b. Pacer Pick II handles emergency requirements generated by Hq Pacific Air Forces or Seventh Air Force between scheduled meetings.

Under the streamlined procedure of Pacer Pick I and II, requirements are documented and submitted directly to Hq AFLC, without Hq USAF approval. The requirement document confirms the action taken and is annotated to reflect either a Pacer Pick I or Pacer Pick II requirement. All items are controlled by the appropriate item manager and are issued when called out by Ground

Rapid Area Maintenance (RAM) is a must in a theater of operations. . . . A RAM team in Southeast Asia repairs a landing gear. . . . Another team member inspects the machine-gun bay of an F-105.

Electronics Engineering Installation Agency for installation.

The results have contributed immeasurably to the AFLC support mission in Southeast Asia.

initial provisioning

One of the most basic responsibilities of the Air Force Logistics Command is to provide adequate initial product support for all new weapon systems and equipment entering the operational inventory. This is accomplished through the initial provisioning process. Initial provisioning is simply the process of determining the range and quantity of spare and repair parts required to support and maintain new systems and equipment during their initial period of operation. The military value of new systems is in direct proportion to the effectiveness of this initial support.

resident provisioning teams

The resident provisioning team concept was developed, and is still being refined, to compensate for the problems created by compression of the development and acquisition phases. It is being applied to all major weapon systems. Under this concept a team of logisticians from the air materiel area assigned management of the system is permanently stationed at the contractor's plant. The team is given the procurement authority of a contracting officer, so that it can place orders for spares and repair parts direct to the contractor. The resident provisioning team is under the jurisdiction of the system manager and is, in effect, an extension of that office.

accelerated provisioning concept

An accelerated provisioning concept has been developed for use by the air materiel areas in accomplishing initial provisioning on short-life contracts (for less than major systems) and emergency modification procurements that do not warrant assignment of a resident provisioning team.

The concept enables the air materiel areas to release initial spares orders some 90 days earlier than conventional provisioning and provides initial support on a more timely basis to meet Southeast Asia operational requirements. It has also been particularly appropriate for use on "short fuze" communications - electronics - meteorological equipment contracts.

contract language and provisioning planning

Continuing effort is being made to improve provisioning contractual language. A provisioning planning chart, listing the provisioning events involved, will be a part of the request for proposal. Each contractor's plan will be considered during the source selection board review and included in the contract when awarded. The provisioning planning chart should provide the basic data necessary to insure at the outset of a weapon system program that it will be logistically supportable at the operational need date.

In addition to the provisioning planning chart, steps are being taken to develop meaningful incentive/penalty clauses applicable to contractor performance in providing initial support.

logistics concepts for Air Force mobility program

National defense policy demands that conventional forces have the ability to respond rapidly to conflicts at any point on the globe. The importance of this policy, known as strategic mobility, is inherent in two of the major USAF long-range objectives: rapid deployment and austere basing of Air Force units. Mobility concepts have been formulated which stress standardization of like units, the capability to deploy full wings or any of their elements rapidly, the capability to deploy these wings to any geographical area in the world, and the ability to begin operations within a few hours after arrival.

The task of introducing and establishing these new mobility concepts is assigned to the Directorate of Air Force Mobility Sup-

port, DCS/Operations, Hq AFLC. As a major part of its mission, the directorate determines, develops, and relates new logistic concepts to operational requirements to obtain an integrated mobility support posture throughout the USAF.

bare-base program

The Directorate of Air Force Mobility Support is the focal point for the bare-base program with AFLC. As part of this program, new air-transportable equipment and facilities are being developed and procured. This enhanced capability will afford tactical forces the flexibility of deploying to and operating from any given environment provided a bare base can be secured. A bare base is defined as one having minimum facilities of a runway, taxiway, and parking ramps and a source of potable water.

Under the program, new hardware emphasizing utility, serviceability, austerity, and air-transportability will be provided to support wing-sized operations at bare-base sites. Development tasks in support of this program are presently in various stages of completion, including a standardized vehicle that can easily be converted for multiple use, lightweight hangars, and expandable shelters.

After considerable research and development effort by Air Force Systems Command, an expandable shelter/container was designed. The basic expandable shelter/container is being engineered and modified by AFLC to serve a variety of functions ranging from administration to maintenance at a bare base. Now known as an "engineered logistic shelter, air-transportable," the reusable structure will be prewired and will store all equipment internally in its air-transportable container mode. Once deployed, the operational shelter will be expanded to approximately three times its container size. Well ventilated and insulated, the shelter will be resistant to weather, fire, fungus, and mildew. In addition, it will be palletized for ease of onload and offload.

Warner Robins and Ogden Air Materiel Areas are the lead AMA's for engineering the logistic shelter. Warner Robins concentrates on prototypes of shelter facilities in the combat support area. Ogden directs its efforts toward shelter for an aircraft maintenance complex; for example, designing physical layouts of shelter facilities for organizational and field-level maintenance areas and providing for equipment location in both the expanded and contracted configurations.

At the present time, all developmental and engineering efforts are being directed toward the enhancement of one tactical fighter wing's mobility structure, to be demonstrated in an actual field exercise late in 1969. The future of mobility in the Air Force will be greatly influenced by the results of this demonstration.

USAF mobility planning

A major portion of the USAF mobility plan, currently being prepared, is concerned with achieving an effective logistic support posture commensurate with approved operational concepts and objectives. To attain the planned objectives, many traditional policies, procedures, and operations will have to be revised. One possible development is to combine common maintenance facilities for aircraft, vehicles, and civil engineering. Another aim is the development of an automatic supply system to eliminate requisitioning by mobility-committed units. A need also exists to determine individual and collective mobility deployment requirements and apply worldwide asset information thereto.

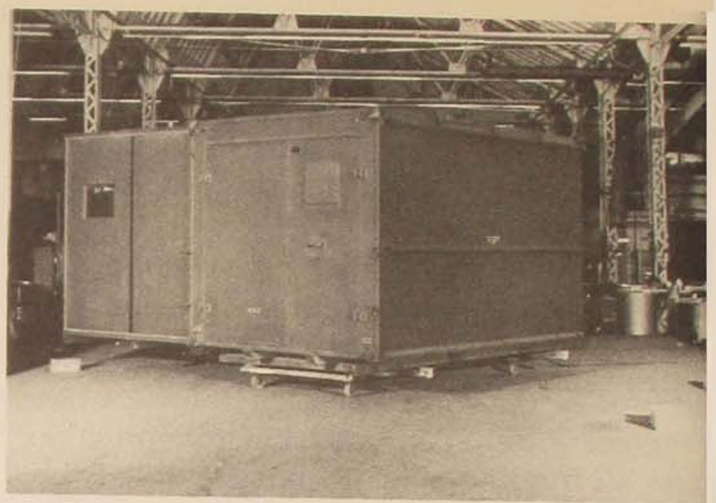
Of major importance in this plan is the purchase of recoverable, air-transportable, mobile shelter facilities for employment at overseas locations. These shelters will be used to enable rapid base activation and to minimize time-consuming, expensive construction of fixed facilities that cannot be redeployed or recovered once hostilities end. The cost effectiveness of such a program is readily apparent.

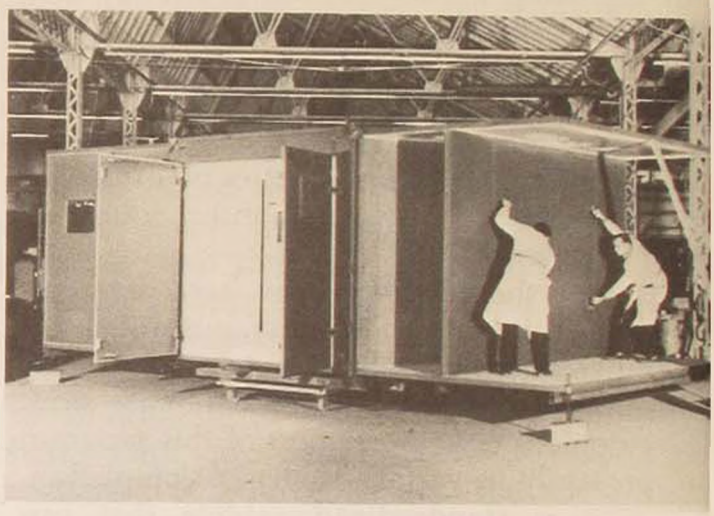
Enhanced mobility for the Air Force of the future is a must. The logistics mobility

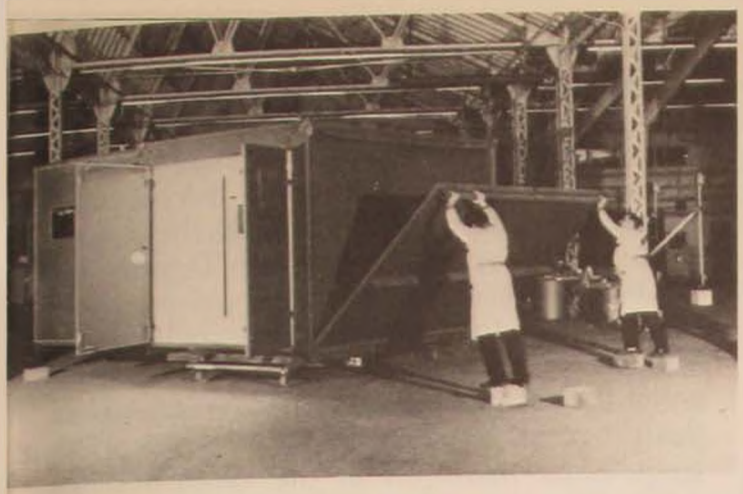
(continued on page 46)

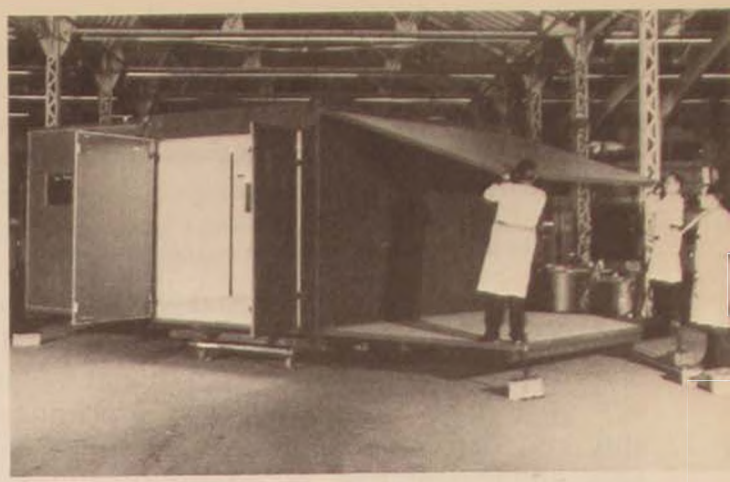
Expandable Shelters

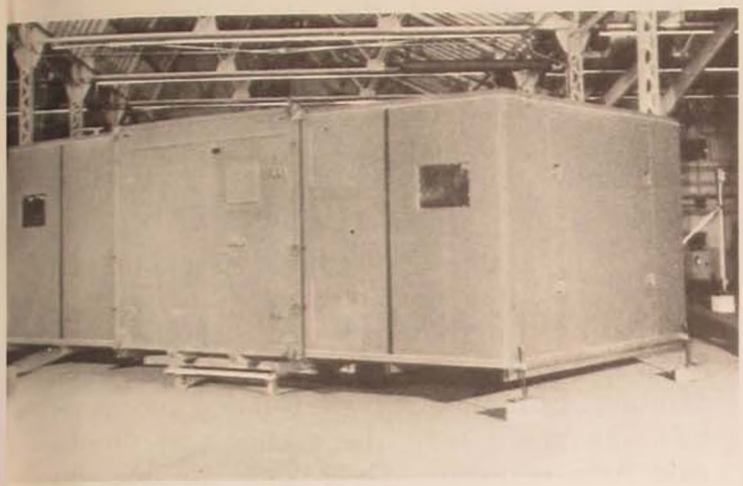
One of the keys to Air Force mobility is expandable shelters. Designed to be air-transportable, easily erected, and easily moved, they enable tactical units to become operational within hours after moving onto a bare base. The unit (above, left to right) can shelter a machine shop, a laundry, or a maintenance shop. The panels fold into the sides of the unit. . . . With front panels open, workmen lower the sides, which become a floor in one end of the unit. . . . Another side panel is raised to form the roof. . . . Braces are fitted in place (below) to give stability to roof and floor, and the door has been installed. . . . The same shelter in its expanded configuration. . . . The shelter must be compatible with the 463L Materials Handling System and the C-130 (being loaded with a similar cargo).

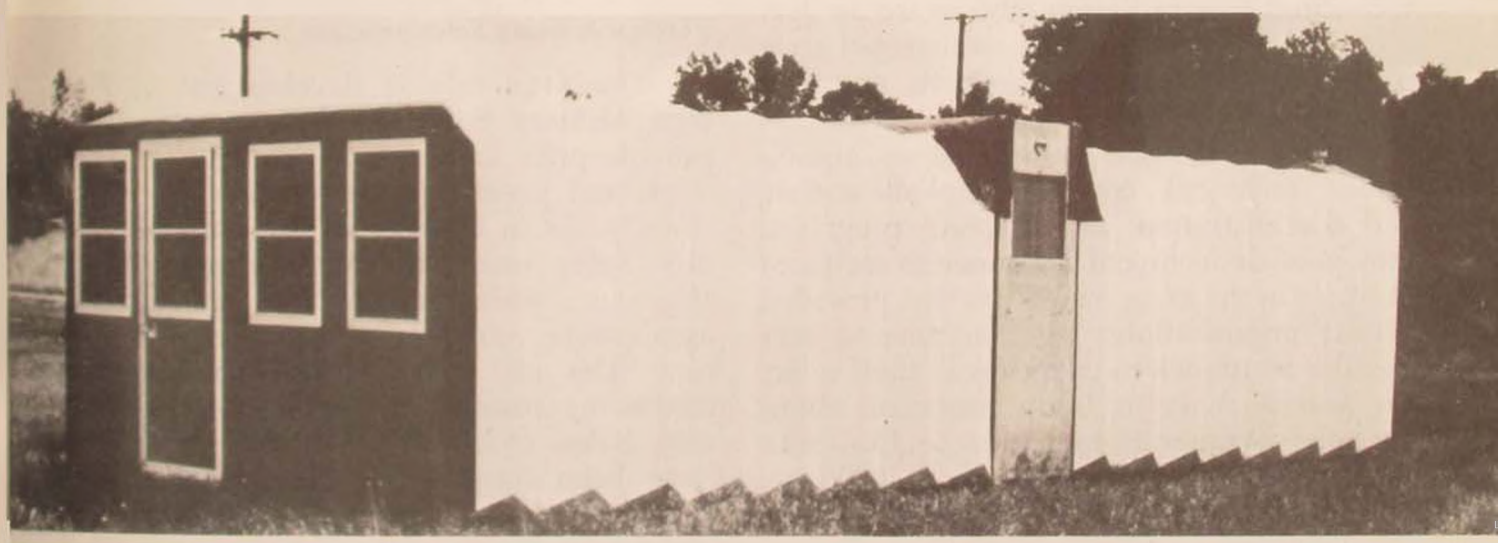












AFLC's Directorate of Mobility Support, working with Air Force Systems Command and the shelter contractor, performs the engineering function for equipment to be used in a shelter. Shown in its most compact form is a prototype of a personnel shelter (left). . . . The expanded shelter can hold bunks and other essentials.

goal is to enable related materiel and support systems to be as deployable as the aircraft of operational units. Once this goal is achieved, the Air Force will truly possess the desired mobility posture.

international logistics program management

In support of United States foreign aid and the Military Assistance Program, at Hq AFLC the Directorate of International Logistics centrally controls policies, procedures, and concepts of operation governing the AFLC implementation of international logistics programs. The directorate serves as the focal point for receipt of approved programs from Hq USAF and direction of these programs to the appropriate air materiel area for implementation. The directorate provides specialized control of several types of programs, including management of weapon systems to be delivered to recipient countries.

A close relationship is maintained with representatives of foreign countries, both Military Air Attaché Group/Mission personnel and foreign nationals, on matters pertaining to international logistics. AFLC personnel make assistance visits to customer countries, and Military Air Attaché Group/Mission personnel and members of the foreign armed services are encouraged to visit AFLC activities. Accredited foreign liaison officers are on duty at both Hq AFLC and at the air materiel areas to assist in implementing projects and programs of mutual interest.

Each of the air materiel areas accomplishes technical control, implementation, and administration of assigned programs. They provide technical assistance to recipient countries in the same manner as that provided to USAF organizations; e.g., Sacramento AMA provides assistance to countries in the Pacific, San Antonio AMA to Latin American countries, and Warner Robins AMA to European and Middle East countries.

Grant Aid/Military Assistance Service Funded programs

Two basic types of international logistics programs are directed to Hq AFLC: Grant Aid / Military Assistance Service Funded and Foreign Military Sales. Grant Aid programs for materiel and logistic services are developed by Military Air Attaché Groups or U.S. Missions located within the recipient country and forwarded through the appropriate unified command to the Department of Defense for approval. Approved programs are implemented in coordination with USAF/ Military Air Attaché Group / Mission personnel of the recipient country. Hq AFLC controls the programs by assignment to appropriate single-point managers at the AMA'S and Hq AFLC. Managers at the AMA'S assume responsibilities paralleling those performed for USAF programs. Once the program is directed into the AFLC system, supply, procurement, and maintenance actions follow essentially the same lines as for U.S. Air Force units. Military Assistance Service Funded programs for Southeast Asia countries follow the same developmental channels as Grant Aid programs except that they are financed under USAF-funded arrangements. Military Assistance Service Funded programs have increased with the addition of Southeast Asia countries. Over 2800 aircraft, involving more than 70 model designations, are supported through the above programs.

Foreign Military Sales program

The AFLC role in development of Foreign Military Sales cases (contracts) is to provide price and availability data for AFLC items and logistic services requested by the country. As in Grant Aid, the Foreign Military Sales cases are initially received at Hq AFLC, which assigns the cases to the appropriate AFLC activity for implementation. The air materiel areas provide the continuing management of a Foreign Military Sales case until all materiel/services have been furnished and all costs to the U.S. government are recovered from the customer country.

The Cooperative Logistics program is a part of the regular Foreign Military Sales program. However, Cooperative Logistics cases provide for the recipient country to

share in the USAF logistics system for the continuing supply support of specified aircraft or other major items.

Foreign Military Sales programs now provide for support of approximately 2500 aircraft, ranging from the C-47 to the F-4 and F-111. One significant trend has been the continuing growth of Cooperative Logistics. As of November 1968, 11 countries had invested $32 million in AFLC spare parts inventories. Deliveries under the program are averaging approximately 2.4 million items monthly.

Centralized Military Assistance Program Accounting and Reporting System

The automated Centralized Military Assistance Program Accounting and Reporting System (H051) is continuously being improved to meet the needs of management within the Air Force and customer countries and to meet the increasing demands of all agencies concerned with the management of international logistics programs. In January 1969, the H051 system computer was programmed to automatically follow up on supply and shipment status, to permit early detection and prevention of potential logistic support problems.

THUS, the Air Force Logistics Command must continuously assume a posture of performance responsive to the dynamics of change, the parameters of which are expressed in the methodological difficulty and technological complexity inherent in the urgent demands for logistic superiority of the United States Air Force.

It is the continuing function of the Deputy Chief of Staff, Operations, to develop and implement the managerial and operational innovations necessary for effective performance of the AFLC mission.

Hq Air Force Logistics Command

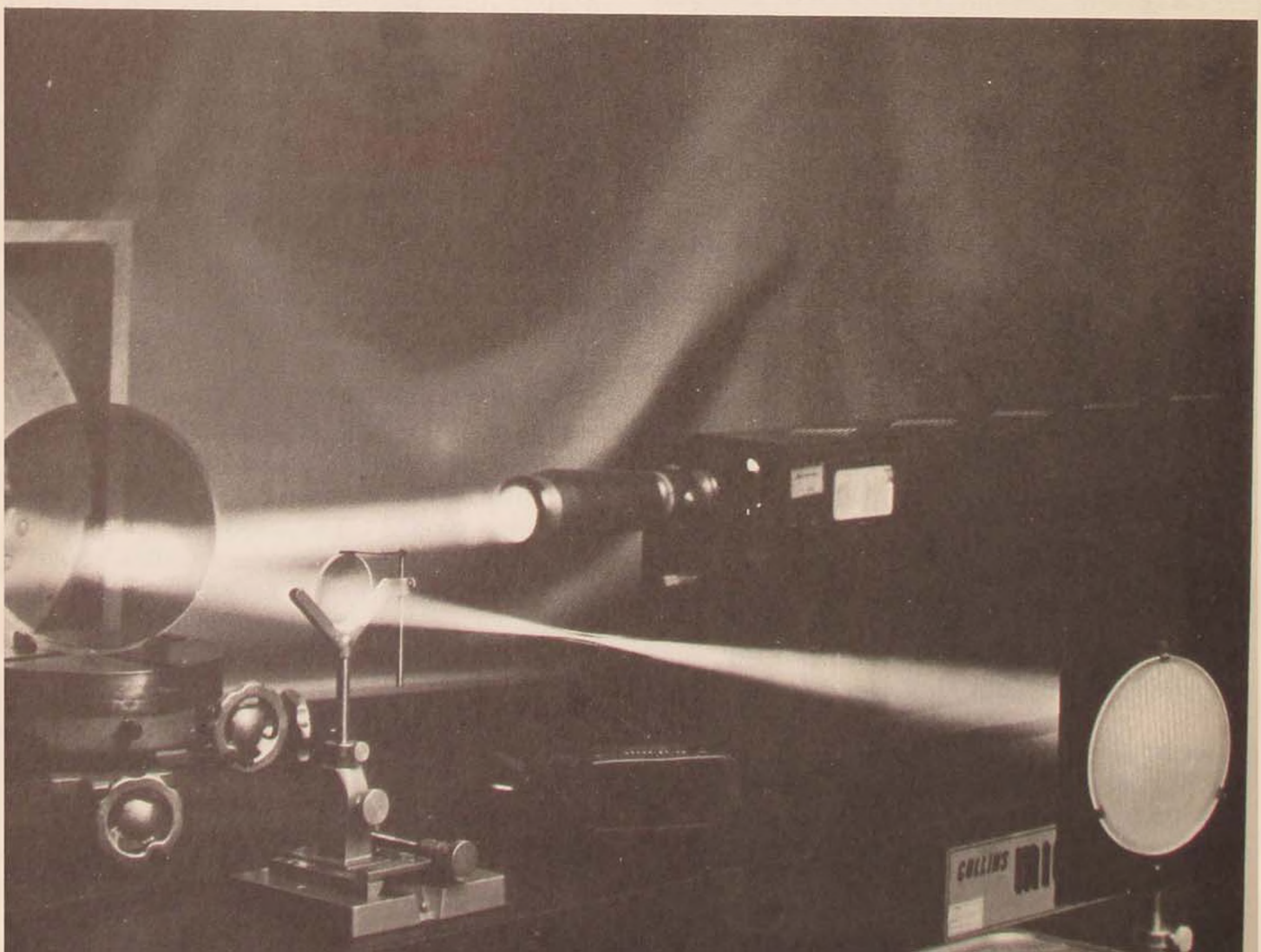
AEROSPACE GUIDANCE AND METROLOGY CENTER

WALLACE L. HORTON

THE U.S. Air Force's single-point repair activity for inertial guidance systems and for management of the Air Force Calibration Program has recently received a new name and organization. The name has been changed from 2802d Inertial Guidance and Calibration Group to Aerospace Guidance and Metrology Center. The new organization provides four directorates and the necessary supporting staff.

The Aerospace Guidance and Metrology Center (AGMC) has three basic mission responsibilities:

- Accomplish single-point repair of inertial guidance systems for aircraft and missiles of the Air Force and other Department of Defense agencies.
- Provide engineering consultant and support services for inertial guidance when requested by cognizant engineering activity and to other DOD agencies when required by Inter-Service Support Agreements.
- Manage the Air Force Measurement Standards Control System and provide technical and procedural direction that assures a single integrated Air Force Calibration and Metrology Program.

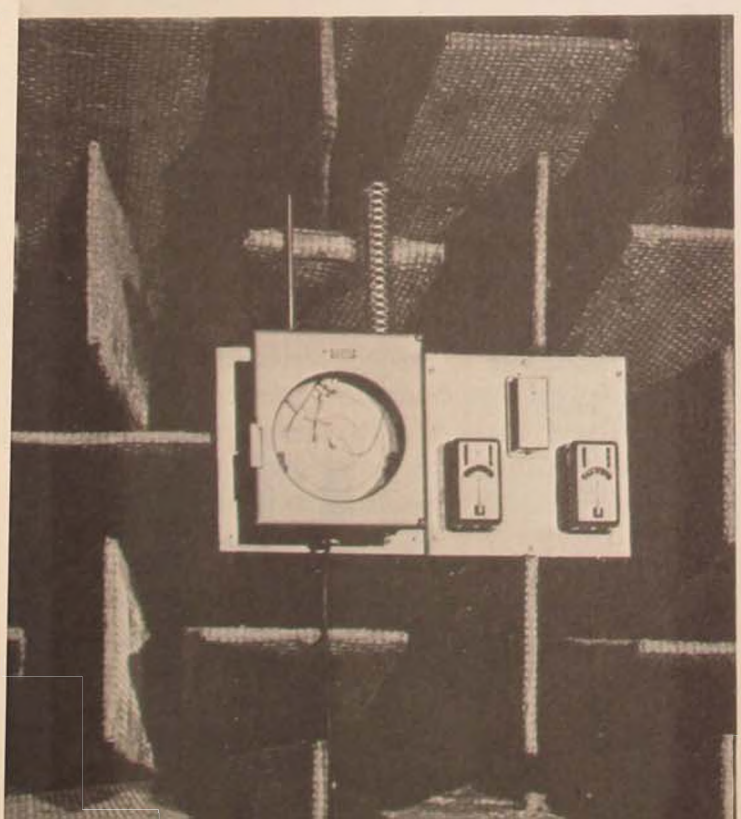


Historically, Newark Air Force Station/ Aerospace Guidance and Metrology Center, located at Heath, Ohio, came into being in August 1961 after Congress approved modification of an excess Air Force plant for this use. This site was selected instead of an active Air Force facility because underground calibration laboratories were desired for temperature and seismic control. The Heath facility already had large and deep underground rooms that were especially designed to be vibration- and shock-isolated from the remainder of the plant. The combination of the geology and the underground construction provided a stability of 10^{-5} g over a frequency range of .1 to 10. Hz. This was an important factor that could not have been predicted in advance on new construction. The main building of the basic plant covers approximately ten acres and houses one- and two-story highly specialized laboratories and engineering offices. The majority of plant laboratories are devoted to the maintenance and engineering of inertial guidance systems.

The first recognition of the AGMC's importance came from members of Congress while they were reviewing its military construction program and justification. At that time the House Appropriations Committee stipulated that "maximum use of the resources to be located at Heath, Ohio, would be made by all three Services."

The production of repaired guidance systems began in October 1962 with the repair of inertial systems used in the Atlas, Titan, and Minuteman missiles. Relocation of the Air Force calibration laboratories from Dayton, Ohio, to Heath and establishment of additional capabilities occurred at approximately the same time.

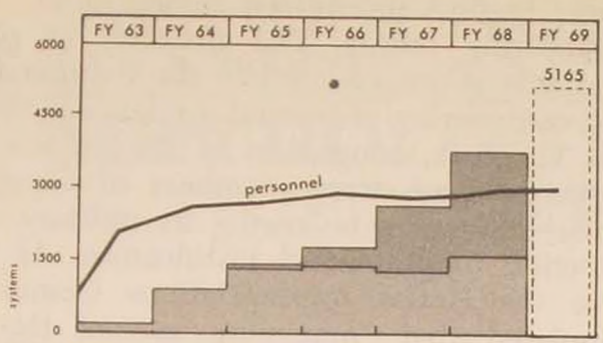
To refer to the Aerospace Guidance and Metrology Center as a "repair activity" seems an oversimplification, yet much of its function is devoted to repair—by use of exceedingly intricate equipment and phenomena: a laser interferometer, with mirrors, beamsplitter, and lens, produces light fringes. . . . anechoic chamber interior.



inertial guidance

The repair concept varies to some degree from weapon to weapon; however, the repair operation is based on a maintenance-to-maintenance repair concept. This means, when a failure occurs, direct shipment to the repair facility, immediate processing, and direct return shipment to the user. This concept is necessary in the processing of such extremely expensive weapon subsystems. To provide timely service to the field commands, the repair facility must be very effective and very flexible between workloads. Inputs from the field are, of course, random in nature. However, the single-point concept for all guidance systems at one location provides a degree of overall stability. The commonality of test equipment for all our inertial guidance systems means a considerable savings when they all are repaired at one place. This is a very important factor in view of the extreme cost of this type of equipment.

To further reduce the high cost of test equipment and also reduce "flow time" and the number of spares required, it has been the practice to work most operations three shifts a day, seven days a week. Another factor in the need for around-the-clock operation is the very long test times involved.



Missiles	125	783	1306	1313	1225	1725	2000
Aircraft			16	376	1266	2364	3165
Total	125	783	1322	1689	2491	4089	5165
Personnel	742	1948	2468	2652	2837	2731	2896	2904

Figure 1. System productivity: number of systems processed per year versus personnel buildup

The work force is made up of highly skilled and specialized technicians and engineers. Training for new systems, new techniques, and new processes is a constant and vital part of the total program. Full-time instructors are used, who in turn are being trained and upgraded by factory training programs under the Air Training Command.

Like a subcontractor, the center negotiates for workloads from a number of weapon system managers. It processes guidance systems for almost all the weapon system managers of the AFLC air materiel areas.

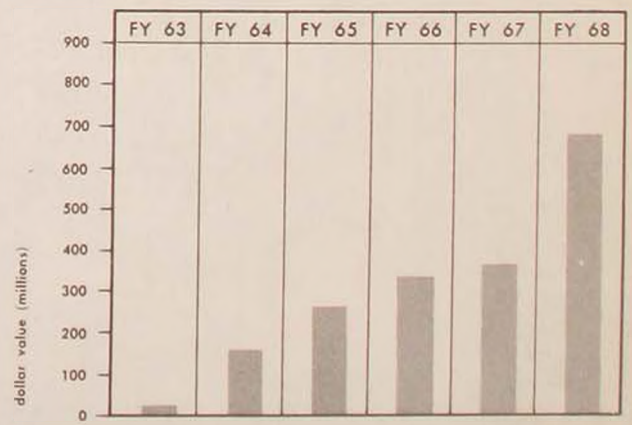
The center operates on an industrial funding concept and therefore is keenly aware of its repair costs compared to those of competing contractors. Experience has shown that considerable savings can be obtained for the taxpayer by single-point organic repair of inertial guidance systems rather than repair by dispersed contractual sources. The volume of business at the center is closely comparable to that of a "large business." At present the acquisition cost of the systems we process each day averages approximately $2,000,000; so the center's total operational cost of approximately $82,000 per day is about four cents on the dollar.

The buildup of the center's activities is depicted in Figures 1 through 3. Figure 1 reflects increases in numbers of systems processed per year versus personnel buildup. During the buildup from July 1962 to June 1966 it was necessary to develop the skills and proficiencies of personnel in addition to accomplishing the workloads. A leveling out of personnel (reflected by the solid black line) is now taking place as the volume of workload still increases and random inputs of the various systems tend to provide an overall smoothing of total input. Figure 2 reflects the increased value of systems processed each year. Figure 3 reflects the increase in value of the test equipment used in processing inertial guidance systems (IGS).

The types of systems being processed or to be processed through the center are as follows:

Present	Future
NS-10 guidance for Minuteman I	N-16 guidance for FB-111
NS-17 guidance for Minuteman II	KT-70 guidance for SRAM
LGM-25 guidance for Titan	KT-70 guidance for A-7
LN-7 guidance for RC-135C	KT-70 guidance for F-105
LN-12 guidance for F-4C	FLIP guidance for C-5
LN-14 guidance for F-111A	NS-20 guidance for MM-III
	LN-15 guidance for B-52

Figure 2. Acquisition cost of items processed: increased value of systems processed each year



Total	25	168	261	318	352	672

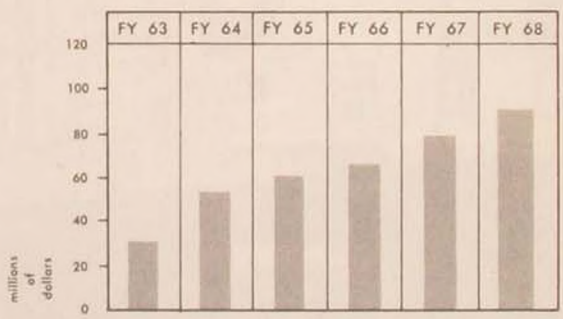
The heart of any effective maintenance program is maintainability and reliability. It is most important that every action be taken to see that new systems are designed to provide maximum reliability under field operating conditions, and that they remain serviceable the required number of hours after repair and are easily maintained upon failure. It is equally important that any weakness in design be properly analyzed and fixes provided to upgrade the system and its mean-time-between-failures. To do these things, a definite program must exist at repair activities to gather detailed, factual data and to analyze such data not only to develop engineering design fixes but also to ensure that experience gained on active inventory is considered during the development phase of future systems. The center has a highly specialized engineering staff to accomplish this important function. These engineers work closely with the design and development groups and weapon system managers so as to input experience gained at the depot. The single-point concept makes it feasible to consolidate engineering data and indicate the strong and weak points of all systems processed during the review of any one new system. An early logistics interface also exists with personnel of the System Program Office (SPO) and System Manager / Inventory Manager (SM/IM) to provide information of logistics experience. In keeping with DOD policy, the engineering staff of the center is supporting other government agencies by providing IGS engineering assistance.

The AGMC engineering analysis staff operates a Central Data Acquisition and Analysis System, through the use of a central computer and analysis programs. The purpose of the analysis capability is to determine the most probable cause of malfunctions in guidance systems returned to the center for repair. The results of the data analysis are used to direct repair actions and/or additional testing for further confirmation or identification of the malfunctions.

To summarize the service engineers' responsibilities, one might say that during the conceptual and acquisition phases the service engineers assist in providing the necessary maintenance support concepts, plans, and maintenance experience data to be used in developing technical requirements for maintenance of new inertial guidance systems. The service engineers participate in design reviews and evaluation of test results to reduce the need for maintenance support. Thus, effective engineering participation can significantly influence technical requirements in design, which, in general, dictate initial and future support investment and operating costs associated with new hardware.

calibration program

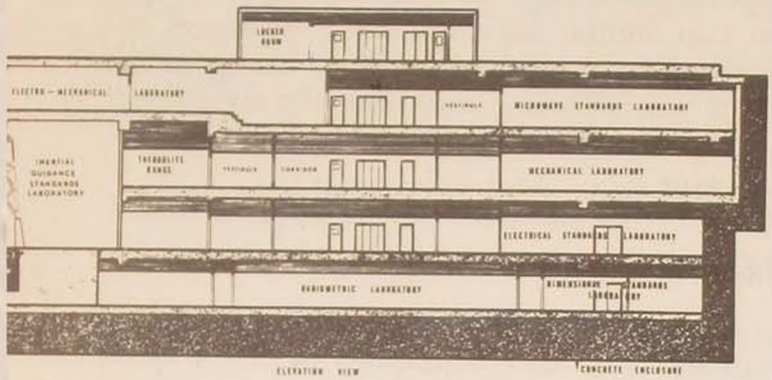
The USAF single integrated calibration program had its beginning in 1954 with approval of a study by Dayton Air Force Depot (DAFD). In 1957 a follow-on study was approved, providing for the establishment of Precision Measurement Equipment Laboratories (PMEL). In 1958 a DAFD study outlined many deficiencies that existed in calibration laboratories throughout the Department of Defense and industry. An area considered very serious was the lack of traceability of standards used by industry to those of the National Bureau of Standards. The DAFD study provided a definition of the "measurement gap" which existed throughout

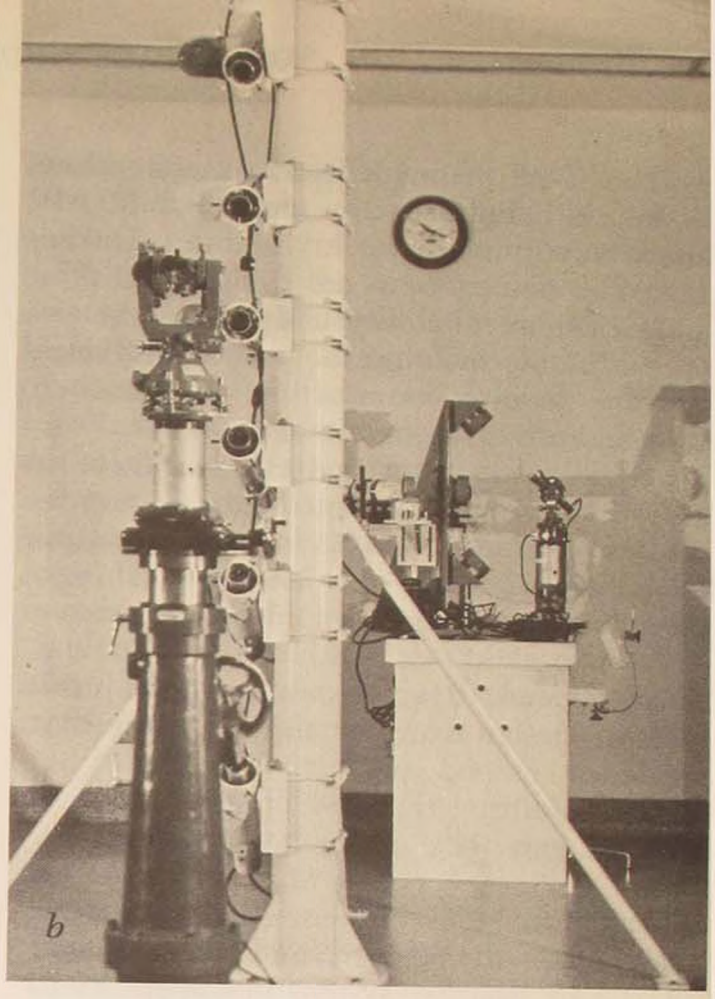


	FY 63	FY 64	FY 65	FY 66	FY 67	FY 68
Inertial guidance systems	31.6	52.0	62.0	65.0	76.2	87.0
Calibration	3.9	4.8	5.2	5.2	5.5	5.4
	35.5	56.8	67.2	70.2	81.7	92.4

Figure 3. Investment growth-equipment: increase in value of the test equipment used in processing inertial guidance systems

Air Force Calibration Standards Laboratory (a) at Newark AFS, Ohio, shown in cutaway. Locker room is at ground level. . . . Vertical test stand (b) for measuring collimation error (horizontal/vertical), trunnion error, etc.





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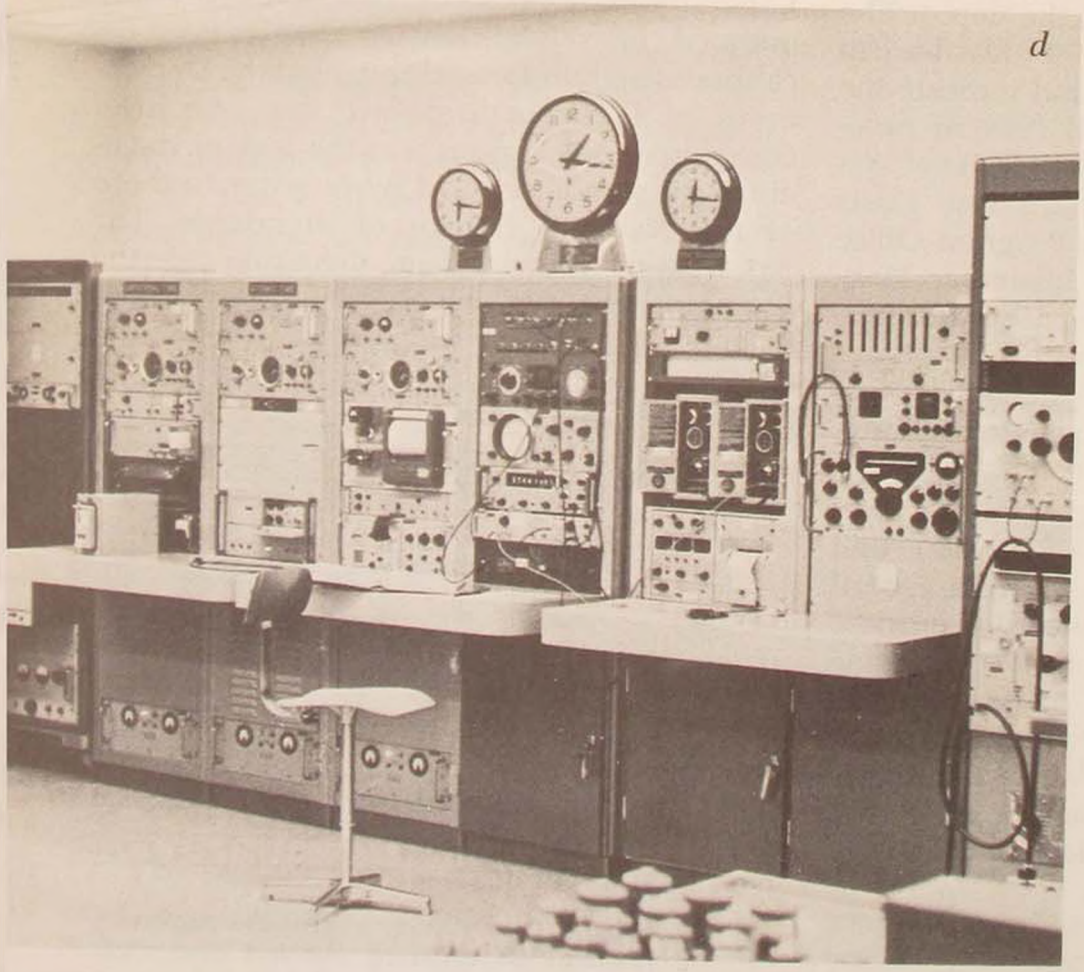

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Time exposure of focusing rays from a 2600°C blackbody (c). . . . USAF primary reference system for maintaining frequency and precise time and time interval (d). Epoch time is maintained on the Universal time coordinated time scale. . . . Technician (e) performing repair to microminiature multilayer board, used in missile inertial guidance system. . . . Infrared tunnel (f) in the calibration laboratory. . . . Technician (g) inspecting internal parts of a missile inertial instrument in clean room.

industry and government. Those involved in measurement standards in DOD and industry, as well as the NBS and professional societies such as the Instrument Society of America, made great strides in the next few years in closing the gap and establishing firm ground rules for acceptable standards.

The number of precision measurement laboratories was increased in 1959 and by late 1960 had reached 163 throughout the world. In 1962 the new laboratories at Heath, Ohio, were completed, providing many new and highly specialized capabilities. One such capability resulted from establishment of an Advanced Weapons Laboratory, whose purpose is to review highly specialized calibration requirements peculiar to new and advanced weapon systems and to provide engineering "laboratory type" evaluation of weapon hardware. An additional responsibility of this group is to develop "standards" for measurement in the advanced areas. The laboratory was equipped with stable test platforms capable of reducing accelerations in the frequency range of .1 to 10. Hz to less than 10^{-5} g. These test platforms are used for support of accelerometer and gyro test equipment and isolate the test equipment from influences of temperature, magnetic fields, humidity, earth motion, and culture "noise," while at the same time remaining perpendicular to true vertical. The Advanced Weapons Laboratory also includes infrared, ultraviolet, laser, and visible light measuring capabilities and standards. Laboratory test equipment is available to allow testing under laboratory conditions of most types of gyros, accelerometers, and guidance platforms.

Air Force policy provides for a single integrated measurement system based on national standards. System engineering, technical direction, and program management are administered by the Aerospace Guidance and Metrology Center. At this time, 15 Air Force commands operate some 160 base PMEL's, following technical direction provided by AGMC.

The Air Force has a system in which all measurements are traceable from national standards maintained by the National Bureau

of Standards to the center's laboratories and thence to the base PMEL's. Weapon system contractors also maintain measurement references with the NBS, thus ensuring a common basis for operational measurement requirements.

Periodic calibration of standards and precision measurement equipment is required at prescribed intervals to ensure continued accuracy and reliability. Calibration intervals are based on stability characteristics of the measurement device.

Base Precision Measurement Equipment Laboratories are established at selected bases, depending upon mission requirements. Every effort is made by the three services, through joint DOD conferences, to prevent duplication of engineering projects and maximize use of common resources in providing area calibration support.

To ensure support of weapon measurement requirements at the base PMEL level, AGMC manages the calibration work much as a weapon or support system is managed by a system program office/system manager. The first step in this process is to work with the SPO/SM and the using command on calibration and measurement problems during all development phases, starting with the conceptual phase and continuing through the definition, acquisition, and operational phases.

When a new standard is required in support of a weapon system, it is programmed by AGMC into the budget buy cycle for acquisition, acceptance, calibration, and delivery to the PMEL having support responsibility. These standards, as well as others, are returned to the center at specified intervals for recalibration. New calibration technical orders are written and disseminated through the regular TO distribution system to the PMEL's.

The center determines the competence of each PMEL on an annual basis by evaluating its personnel, equipment, and facility resources against specified standards of excellence. This results in certification of the PMEL or imposing measurement restrictions until the standards are met.

The laboratory complex below ground has four floors, descending in a tier, the lowest level at a depth of 65 feet. The underground laboratory is operated as a high-quality clean room and employs the very strict environmental controls necessary for precise measurements.

A LOOK into the future shows that the requirements for accuracy in measurements and standards will increase by a considerable amount. This will mean that new materials and other technical breakthroughs must be devised in order to meet the challenge. Among the new measurement areas that will require a great deal of specialized attention will be lasers, blackbodies, ultraviolet and infrared radiation, solar and stellar simulators, inertial reference systems, high vacuum, submillimeter microwaves, microminiature length measurements, cryogenics, ultra high and ultra low temperatures, nuclear radiation detectors, photometry, propagation of sound, plasmas, high-velocity micrometeorite particles, nerve gas detectors, biological agent detectors, and ultra precise time synchronization.

In the future, emphasis will shift to providing selected PMEL's with high-cost calibration capabilities in special areas of measurement.

As advances are made in weapons technology, the metrology problem becomes more demanding and sophisticated. Oftentimes "measurement gaps" exist until the required standards can be developed and produced. The diminishing reaction time in which to produce new measurement standards was graphically stated in a recent NBS bulletin:

> It is well known that the lag time between the discovery and application of major developments is swiftly decreasing: a. Over 50 years for electric power generation. b. About 4 years for the transistor. c. About 19 months for the laser. A consequence of this acceleration is that new standards are required barely moments after discovery.

Newark Air Force Station, Ohio

SUPPLY SUPPORT

MAJOR GENERAL JOSEPH R. DELUCA

MUCH of the military success enjoyed by our armed forces in past conflicts has been due to the emphasis that the military establishment has placed on the ability to provide logistical support to the field units. Part of this success, of course, is due to the unequaled industrial base existing in the United States. A maximum effort is constantly under way in the search for better and more reliable weapons and equipment, faster and more responsive transportation and communications, improved training, and more cost-effective management. This logistics emphasis has resulted historically in our armed forces being the best equipped, trained, and sustained of any fighting force in the world.

Logistics planning and performance are now almost on a par with operational strategy, since operational and logistical capabilities are inextricably linked together. The supply function, within the overall structure of logistics, supports all the other functions of our mission forces. A fleet of airplanes without fuel, munitions, or needed equipment is an impotent force, as is a maintenance activity without necessary repair parts. The cargo planes comprising our substantial airlift capability would soon be grounded without replacement parts. Our communication and warning systems would soon be silenced. This is not to minimize the essential contributions of other logistics functions; all are vital. Accomplishment of our logistics missions is dependent upon the effective and integrated operation of all functions. Our intent, however, is to demonstrate the decisive importance of having materiel in the proper place, at the time it is required, and in the quantities required. This, oversimplified, is the AFLC supply support mission —in integrated operation with procurement, maintenance, engineering, transportation, communications, construction, and resources management.

Significant strides have been made in the supply support function since World War II, many of them accomplished out of expediency. After World War II the major portion of our national resources was again diverted to peacetime uses, and the armed forces had to apply more intense management to the limited resources in order to make them responsive to mission requirements.

In the early 1950s, more sophisticated weapon systems began phasing into the Air Force inventory, bringing with them increasing complexities of supply management, item identification, requirements, distribution, repair, maintainability, reliability, engineering, and supportability. These phenomena provided the impetus to the evolution of supply management from its World War II status to the current posture of highly automated processes, utilizing at base and depot levels high-speed computers, communications, transportation, materials handling, and improved movement and management techniques to optimize use of available resources. An indication of what improved logistics management has accomplished is the fact that the dollar value of inventory investment is approximately the same now as it was a decade ago despite the fact that the number of different types and models of weapons has risen from approximately 160 to 294.

Before delving into the role of supply in the overall logistics process, a quick review of the scope of the supply operation is in order. AFLC currently manages a stores inventory of approximately $12 billion worth of spare and repair parts, including munitions, engines, and ground-support equipment, and another $12.5 billion of in-use equipment and installed assets such as engines. The Air Force is a user of 1.7 million items of supply, and AFLC centrally manages approximately 900 thousand of these items. The remaining 800 thousand items are managed by the Defense Supply Agency, General Services Administration, and other military services. The AFLC procurement authority for spare parts, equipment items, and services for fiscal year 1969 is approximately $3.2 billion. An operation of this magnitude presents many, varied, and complex management problems.

There are two distinct echelons of supply management in Air Force logistics: the retail or base level, where most demands

for spares and parts originate, and the wholesale or depot level. This article will deal primarily with the wholesale level, since this is where AFLC's major internal responsibilities are concentrated at this time. However, it is the Air Force target to develop closed-loop supply management, linking bases, depots, and contract production and repair into one visible total pipeline system. The most important advance so far toward making this possible is the Air Force-wide program standardizing and automating the base-level supply system on a controlled design basis, which has provided the management plateau conducive to advancing. We are now working to system-link the depot computers with the standard base-level supply computers.

Until 1952, all supply management responsibility was centralized in AFLC headquarters at Wright-Patterson AFB. Since that time supply management has been decentralized to the present five air materiel areas, which, under the Air Force direct-supply concept, receive requisitions and fill them direct to users on a worldwide basis.

system and commodity management

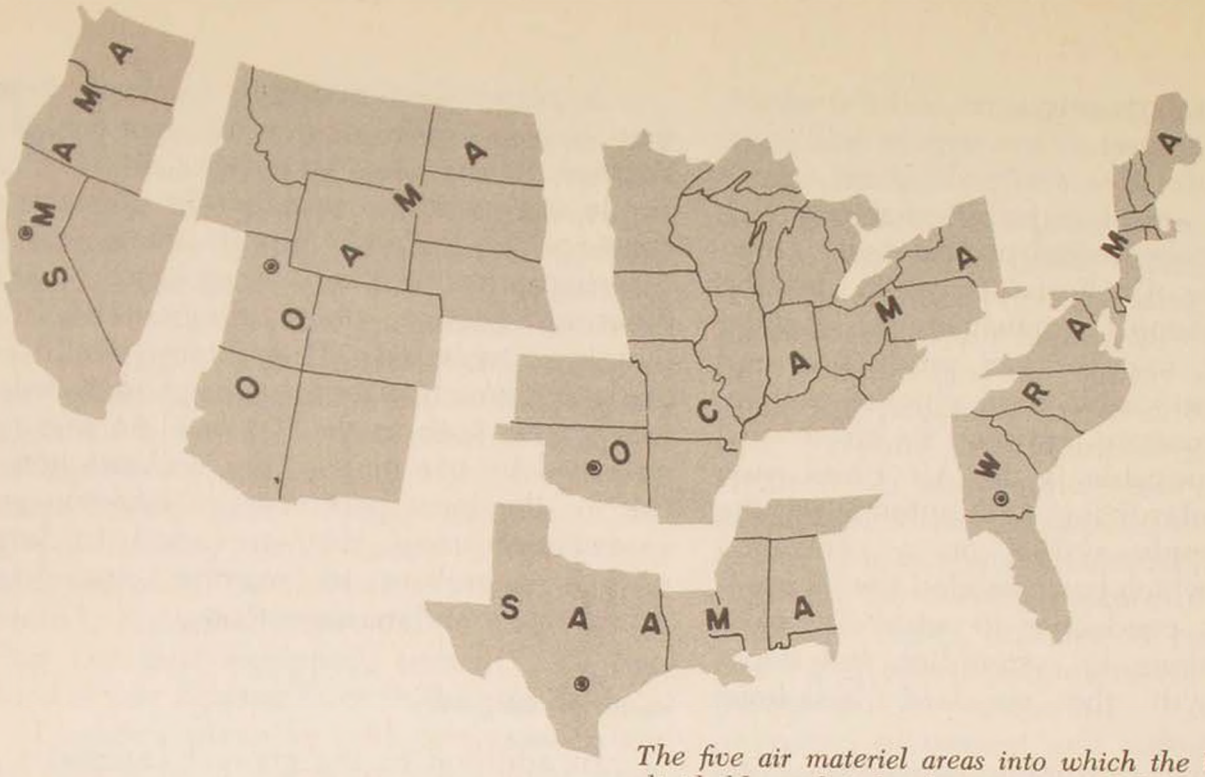
Supply management is divided into two general overall categories within AFLC: system management and commodity management. A system manager is responsible for total logistics support for all the items of supply needed to keep systems such as the F-4, F-111, and C-130 in a mission-performing posture, irrespective of whether the items are managed by AFLC, Defense Supply Agency (DSA), or General Services Administration (GSA). The system manager manages directly those items that are peculiar to his system. Each peculiar airframe and related subsystem item is materiel-management-coded to his weapon system management regardless of its Federal Supply Class. For example, those bearings that have a peculiar application to the F-4 would be assigned the materiel management code "BF" at the end, to show this condition of peculiarity and enable requisitioners to route requests to the proper manager.

A commodity manager manages items that have a wide degree of commonality. Warner Robins Air Materiel Area, for example, is commodity manager for all types of bearings in Federal Supply Classes 3110 (bearings, anti-friction, unmounted), 3120 (bearings, friction, plain, unmounted), 3130 (bearings, mounted). These items would include all items not materiel-management-coded to a system such as the F-4 or C-5A and not managed by DSA or GSA. DSA and GSA activities for the most part manage common and commercial items that are used in large enough quantities to warrant centralized procurement and management.

materiel categories

In addition to the general categories of system and commodity management within AFLC, three basic categories of materiel are specified for management purposes. These materiel categories identify item characteristics warranting specialized and differential management attention.

Recoverable. The most important materiel category in terms of spares inventory investment, and the most complex from a management standpoint, is that classified as "Recoverable." Recoverable items have a high unit cost, can be repaired by base or depot maintenance facilities, and have a long service life. Because of their high cost and predominance in terms of our total spares inventory investment, these items are afforded intensive management. The Air Force Recoverable Assembly Management System (AFRAMS), implemented in November 1967, provides constant worldwide visibility of assets by linking the retail or base-level systems to the depot or wholesale supply systems. This constant worldwide visibility of recoverable spares gives our inventory managers greater capability to compute requirements, distribute assets, direct reparable carcasses to repair activities, and detect supply trends on their assets. AFRAMS features daily asset reporting, from every Air Force base, for each recoverable item centrally managed by AFLC that had activity in the preceding 24-hour



The five air materiel areas into which the United States is divided have their headquarters at Oklahoma City (OCAMA), Ogden, Utah (OOAMA), Sacramento (SMAMA), San Antonio (SAAMA), and Robins AFB, Georgia (WRAMA).

period. AFLC manages some 75,000 recoverable items, comprising some $5.3 billion of inventory or approximately 44 percent of the total worldwide Air Force inventory of $12 billion for supplies. So the magnitude of the system and the essentiality of giving it maximum management effort are apparent.

Replacement. The second major materiel category relates to replacement or equipment-type items. These items are nonexpendable, reparable at base or depot, and require formal authorization in table of allowance documents for an organization to acquire them. This category includes such diverse items as test equipment, vehicles, hand tools, training equipment, organizational clothing, parachutes, ground radar and communications equipment, and the ground equipment used by maintenance activities, such as engine test stands, ground generators, compressors, heaters, etc. Unlike recoverable items, which have established depot stock levels and are designed to have materiel on the shelf when a requisition is received, stock levels for replacement items are not normally maintained, except a very few specially approved levels held for initial issue, lengthy replacement time, or contingency. AFLC manages approximately 84,000 of these items, which represent some $600 million in inventory and $7.5 billion of equipment in use by Air Force organizations.

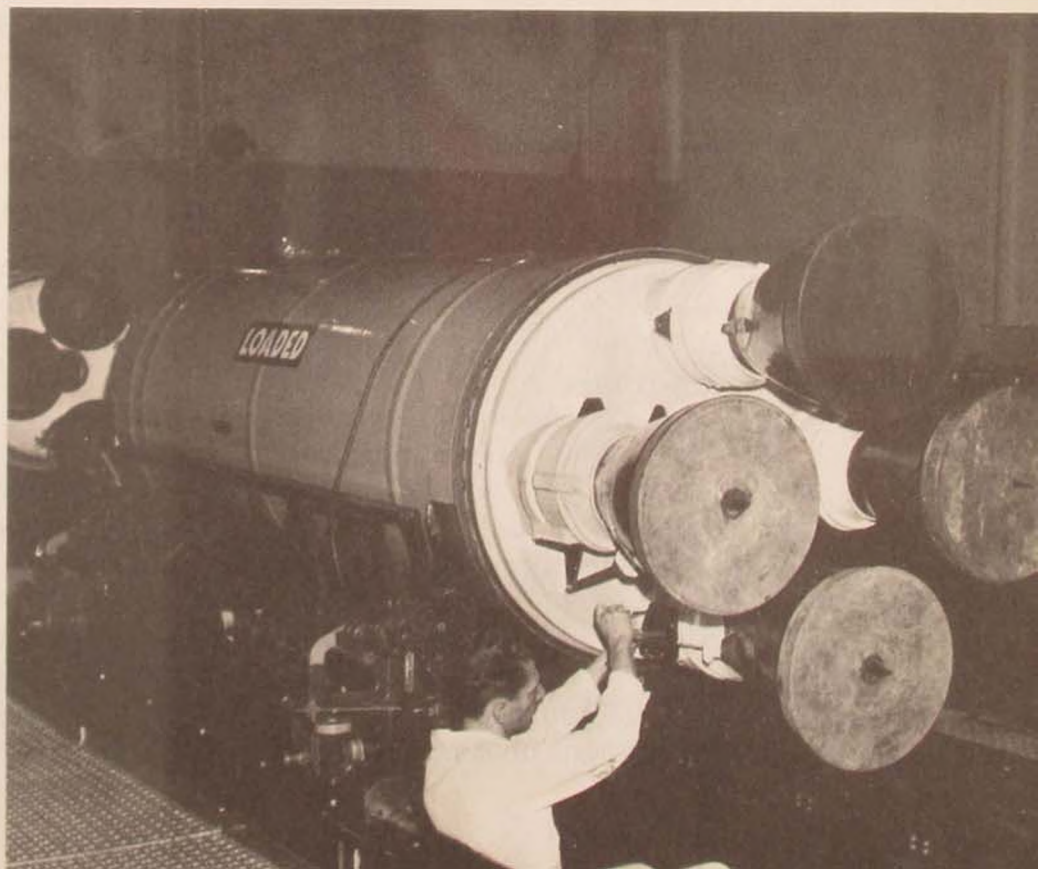
EOQ. The third major materiel category relates to Economic Order Quantity (EOQ) items or expense items (repair parts and other items consumed in use). These items for the most part are lower in cost and are expendable. The derivation of the name for these items is from the associated stockage and procurement philosophy which relates the quantity ordered or procured to the order or procurement costs. The level of management intensity applied to this type of item is not as great as that applied to recoverable items. They are managed under EOQ techniques. High-demand items and items used primarily for depot overhaul get further selective management treatment beyond normal EOQ procedures. The number of EOQ items centrally wholesale-managed by AFLC is 750,000, representing $1.6 billion in inventory at depot and base levels. Additionally, our bases secure supply support for the hundreds of thousands of EOQ items that

are common and commercial in nature and managed by DSA or GSA or locally purchased.

Effective in July 1968, the management of these AFLC centrally managed EOQ items came under the purview of the System Support and General Stock Fund concepts. Under these stock fund concepts, management control is exercised over the dollars used to procure these items and the dollars of inventory on hand and on order as related to sales. Users forecast their usage and ideal inventory positions, and monthly reviews of progress toward these objectives are made. Under certain conditions base users can return excess materiel to the stock fund for credit. The stock fund concept is designed to minimize inventory investment, optimize inventory turnover, accelerate the reporting and utilization of excesses, and serve as a link in the Department of Defense Resources Management System.

Thus, AFLC manages three different basic categories of items, each of which requires selective management methodology, requirements techniques, and distribution control. All three categories are managed through automated systems, and tailored computer logic applies to meet the specialized needs of each type of item.

In addition to the basic categories discussed above, AFLC has adapted special management techniques to some other highly specialized categories, such as engines, fuels, conventional ammunition, and nuclear ordnance commodities, mainly because of high dollar costs, peculiar management requirements, and security considerations. For example, a special management system is used for engines, primarily for investment and support effectivity reasons. Installed engines represent an investment of $5 billion, with spare engines representing another $1.9 billion. Unlike most recoverable items, the extremely high unit cost, relatively small number, and basic character of engines make practical the tracking of each engine at all times. Not only is an engine's location known but also its condition during various stages of overhaul, time of installation or removal from a specific aircraft, and number of operating hours since last overhaul. Management through daily visibility is maintained on



A missile mechanic at Ogden Air Materiel Area, Utah, installs shipping links on the nozzles of a second-stage Minuteman motor.

each engine by serial number as it changes status, location, or condition.

Currently, most customer support is strictly on a "pull" basis from the base level whereby the base computes a stock level and requisitions direct on AFLC depots. However, our high-priority missile systems are supported under a "push" system called the Automatic Resupply Logistic System (ARLS). Under this concept, the AMA system manager centrally computes stock levels for all the operational organizations based on daily transaction reporting from the using activity, and he pushes materiel to them as usage warrants. Engines are on a "push" system; so are some munitions in special circumstances. In summary, within AFLC the supply management techniques employed are tailored to operational support effectivity, the economics of inventory investment, the peculiar characteristics of the item, its repair characteristics, security classification, or other characteristics of control specified by higher headquarters.

item introduction and management

The function of supply support begins with the transitioning of systems from research and development to production and operational status. AFLC supply activities become involved early during this stage of the acquisition process as a part of the AFLC team or system manager working with the Air Force Systems Command (AFSC) System Project Office (SPO) that is responsible for the design, development, test, production, and introduction of the weapon into the Air Force operational inventory. An AFLC system manager is designated and AMA personnel are assigned to work with the contractor and the System Project Office. Under an agreement between AFSC and AFLC concerning newer Air Force weapons being introduced, an AFLC officer actually serves as the director of logistics for and within the organization of the SPO. The purpose of this is to assure that both weapons performance and support logistics are fully considered in the many important trade-off decisions made upstream in the design/development phases. Paramount considerations are reliability, maintainability, repair-level decisions, test equipment, ground-support equipment, technical data, operational concepts, maintenance concepts, procurement concepts, and supply support. Follow-on logistics support effectivity and economy are key decisions influenced by the design of the weapon. Thus, considerations of logistics effects now enter into the trade-off decisions that influence design and performance of the weapon or equipment.

With procurement of the end item, spares and repair parts are procured in nominal quantities intended to support the end item during its early existence or until accurate usage data can be acquired to justify larger procurements. This selection of initial spares is referred to as the provisioning process. During provisioning, engineering estimates of items needed to repair the system are provided by the contractor. From these data AFLC technical and supply personnel, with the assistance of contractor personnel and DOD files, screen the items to make sure an identical or acceptable item is not already in the system, determine the degree of recoverability, determine the quantities to be procured, assign management responsibility, acquire maintenance and technical data, and catalog the items selected for procurement. Practically all items managed by AFLC enter the inventory through the provisioning process.

AMA Director of Materiel Management

The brain and heart of our supply management system is the organization of the Directorate of Materiel Management at the AMA in which the system and commodity managers are located. These managers report to the Director of Materiel Management.

Items entering the inventory are assigned to a system manager or commodity manager, who has full responsibility for the support of a system or commodity to the operating forces of the major commands. Assisting the system or commodity manager in the execution of his responsibilities are individual item managers, technical managers, and

production managers, backed up by the managerial and technical services of other functions such as engineering, materiel services, data products, and management systems.

The item manager has the preponderance of direct control over the management of items, working in close coordination with the technical and production managers. He is primarily responsible for the computation of requirements, distribution of assets, effective support to the operating commands, and accountability for his items in all or various stages of their use. In accomplishing these central tasks, the item manager triggers a wide range of activities such as procurement initiations, repairs schedule development, processing of assets to disposal, etc. He also directs redistribution of assets from user, provides shipping instructions for return of reparables when necessary, and otherwise attempts to optimize the use of his items in support of mission requirements on a worldwide scale.

The technical manager works with the item manager and is an expert in all technical aspects of the item. He participates in provisioning and reliability conferences; provides technical assistance to using activities and repair facilities regarding the operation, maintenance, or modification of his items; studies patterns of failure rates to determine if design specifications are being met; initiates technical orders on the items if necessary; and develops the maintenance factors for use by the item manager in computing requirements.

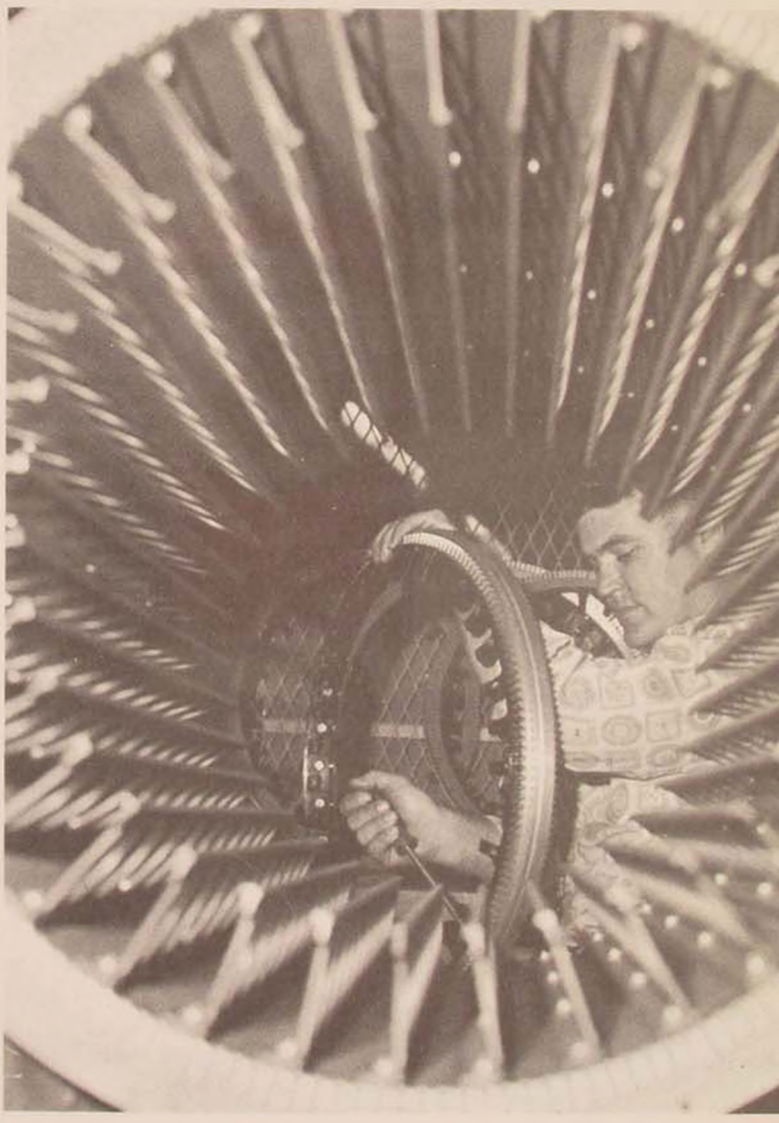
The production manager plans, schedules, and monitors organic, interservice, or contract repair and modification programs. In this capacity he negotiates repair workloads with maintenance activities, assists in resolving parts support problems, expedites reparable carcasses through the repair line, and maintains essential production surveillance to meet the repair schedule and changes set by the item manager.

The item manager, technical manager, and production manager, backed up by other managerial and engineering support people, are the key decision-makers in an AMA for supply management and support. They continually deal with the changing programs, resources constraints, dynamic user needs, advancing technologies, materiel defects, contract variances, trade-off considerations, and decisions on lead time away.

responsiveness

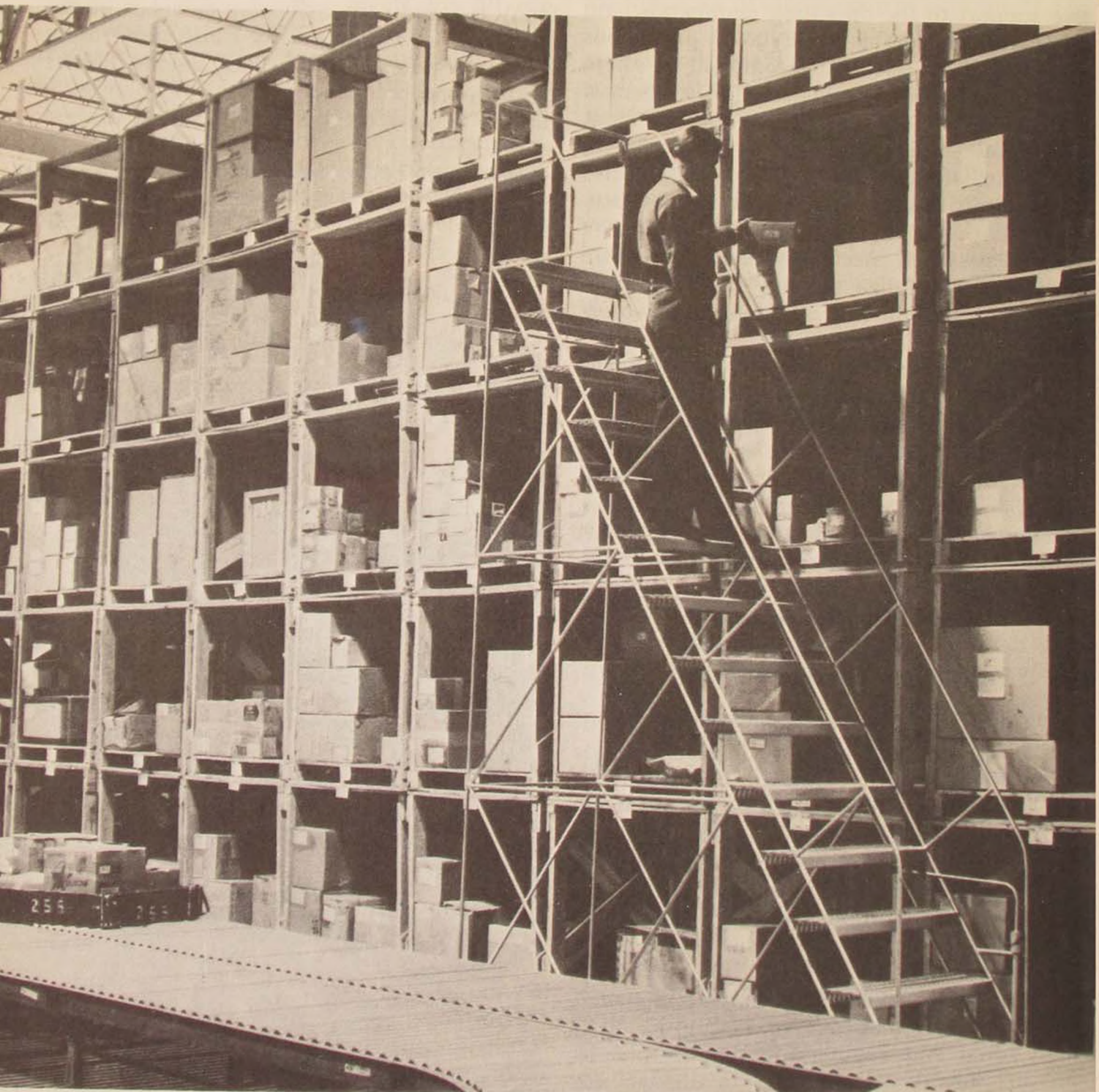
A primary necessity of the supply function today is rapid responsiveness to needs of the operating forces, especially those performing combat missions, such as our Pacific Forces or sustained readiness postures of other commands. Having the item on the shelf when a

Framed by the canister from an M-61 Gatling gun cannon, an aircraft armament repairman at Warner Robins Air Materiel Area adjusts tension screws on canister gear ring.



requisition arrives is important; equally important is its delivery to the customer by the time he needs it. Because of limited resources, it is also important that materiel not capable of repair at base level be returned promptly to the depot. This urgency has necessitated increased use of airlift, quick communications, and efficient materials handling, to reduce pipeline times and ensure optimum utilization of materiel resources.

Flexibility and adaptability also are essential for effective and efficient supply operations. The current emphasis on development of conventional war capability necessitates increased mobility to minimize the costly construction of permanent facilities,



minimize the outflow of gold, and still provide close air support for our ground forces. The supply system has to be flexible and adaptable to keep pace with the new mobility concepts.

As an example, it became apparent early in the Southeast Asia (SEA) conflict that existing airfield facilities in South Vietnam were insufficient to handle the amount of air traffic needed to support American and South Vietnamese forces. A technique was developed to provide temporary supply support in the form of "Harvest Eagle" sets to new airfield construction projects. The purpose is to establish an operational air base in a short time where a runway may

More than 2,000,000 square feet of storage space, in 83 stockrooms and four open storage areas, accommodates the 400,000-plus items that Oklahoma City Air Materiel Area issues to Air Force activities. . . . The automatic Data Processing Center at Hq OCAMA processes a vast amount of data associated with management of weapon and propulsion systems located worldwide, thus facilitating the instantaneous reaction demanded of the logistics system.

already exist or can be quickly made ready to handle traffic until more permanent facilities are constructed. A Harvest Eagle set usually consists of field kitchen, sleeping gear, auxiliary electrical generators, water purification units, bath and laundry units, and other housekeeping items—over 700 different line items totaling some 75,000 units of supply, weighing about 323 tons, and comprising some 44,000 cubic feet in aggregate mass. Several of these sets are maintained in storage in a state of immediate readiness to meet all emergencies and contingencies. The SEA conflict was the first time that AFLC was asked to deploy these sets, and many lessons were learned with respect to climatic conditions, personnel needs, construction, transportation, reutilization, and control.

A close companion of the Harvest Eagle set is the War Readiness Spares Kit (WRSK), containing "selected spares and repair parts needed to sustain operations without resupply at a base which is to be deployed or to be in a dispersed location for the first month of activity in USAF War Plans." It contains direct support items; i.e., those parts required to keep aircraft in a mission-performing condition. Kits are available for many types of aircraft: bombers, fighters, transports, etc. One of the desirable features of these kits is that they are tailored to the peculiar needs of each command; i.e., by weapon, flying-hour program, and war commitment as outlined in USAF War Plans. Thus, the WRSK's provide supply support for the mission aircraft and, in combination with the housekeeping support provided by Harvest Eagle sets, enable the Air Force to better achieve mobility. Much work is being done in this area for better readiness and sustainability. New concepts in equipment design, packaging, setup, utilization, and relocation have been developed and are scheduled to be tested at North Field, South Carolina, this year. The outcome of these tests is most important to the Air Force, since they will have far-reaching influence on logistics support concepts for bare-base operations, mobility, readiness, sustainability, and quick-reaction capability.

An example of current supply-system response to emergency needs can be illustrated by an incident that occurred earlier this year. A warehouse containing electronic and engine spares was completely destroyed through enemy action in SEA. Prompt consultation between PACAF and AFLC resulted in the assignment of a project code that would provide a special priority for the requisitions covering replacement of the items destroyed. Within 24 hours after the warehouse was destroyed, the base had placed approximately 10,000 replenishment requisitions to AFLC AMA's and other sources of supply such as DSA. All sources of supply were requested to assign a monitor to these special project requisitions to ensure prompt action. Seventeen days after input of the requisitions, 94 percent of all requirements had been received by the base in SEA.

Another example of our response to emergencies can be seen in our supply support of the escalation of munitions activity in Southeast Asia. It was necessary that our capability to produce, deliver, maintain, and store munitions be significantly increased within a period of a few months. Expenditures for munitions procurement increased tenfold to more than $1 billion per year. Requests, procurement, engineering, and production were expedited. Also, AFLC devised and implemented a unique floating storage and support concept to provide munitions to the combat forces. Called "Special Express," the 19 oceangoing vessels involved successfully supplied the forces until storage facilities were built and a regular transportation system established. Special Express demonstrated the capability of delivering in excess of 100,000 tons of munitions to Southeast Asia per month.*

Assurance that the supply systems can react is provided by a wide range of responsiveness indicators continually monitored by AFLC supply management. Among the most widely recognized are NORS (Not Operationally Ready, Supply) rates on selected weapon systems, ENORS (Engines), status of War Readiness Spares Kits, processing time frames

*"Special Express" was the subject of a story by Lieutenant Colonel Ruskin M. Bland in *Air University Review*, XVIII, 5 (July–August 1967), 36–42.

within the AMA's (depot processing time), fill rates, back-order rates, and pipeline time, i.e., total time elapsed between the time a requisition is initiated by a mission organization until receipt of the materiel. Performance standards are determined for each of these indicators, to establish degrees of achievement required, corrective actions, and management system improvements.

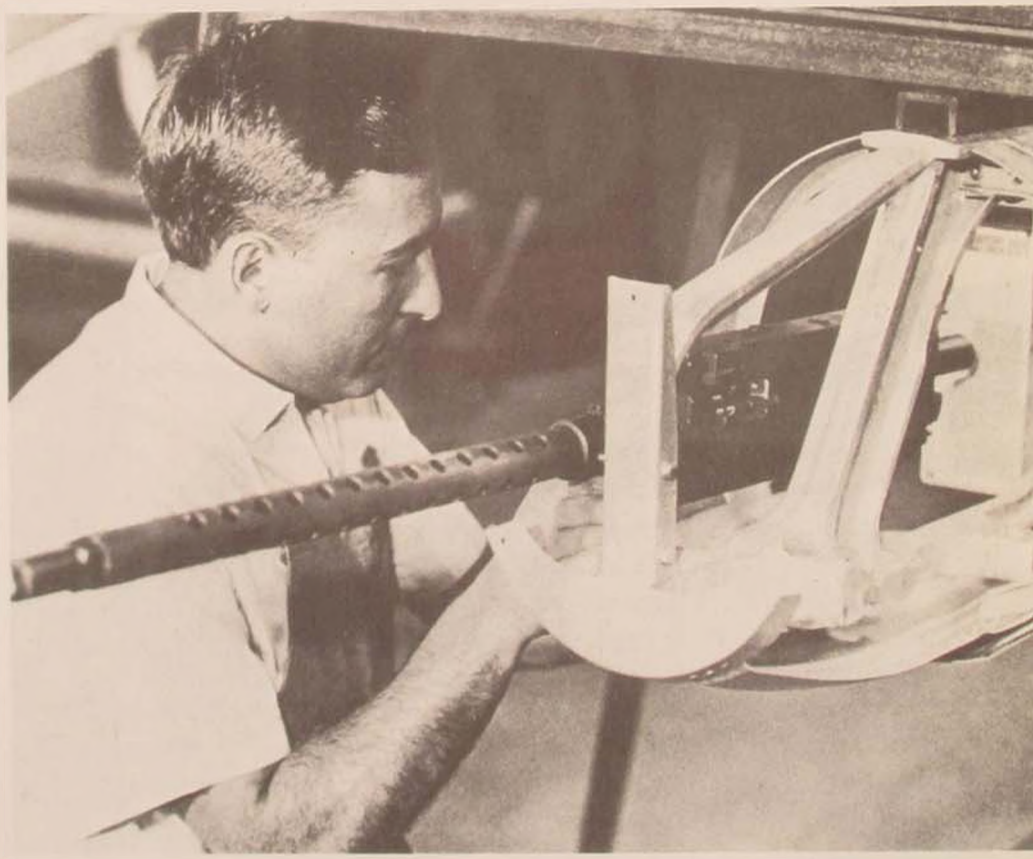
challenges

Significant advanced management concepts and techniques are under development or in early stages of implementation that will have major impact on logistics and supply managers, challenging them to an exciting future. The central theme in these new challenges is to integrate the logistics functions into better defined, structured, and working processes, so as to bridge the gaps between the weapon and equipment design/performance considerations, logistics effectivity considerations, and cost constraints. Much analysis, work, trade-off studies, alternative choices, coordinated compensating initiatives across functions, and evaluative techniques will be required to make progress on this now better illuminated path towards integrated logistics.

Among the many advanced managerial concepts, techniques, and challenges are six key ones:

- Integrated Logistics Support (ILS)

This concept calls for positive management actions integrating all support elements to optimize availability of weapons/equipment and support costs. It states that achievement of integrated logistic support is dependent upon the integration of logistics considerations into the systems engineering and design process. There is a vital and dynamic interface between weapon design and support. It requires the early integration of support criteria into design considerations. In an oversimpli-

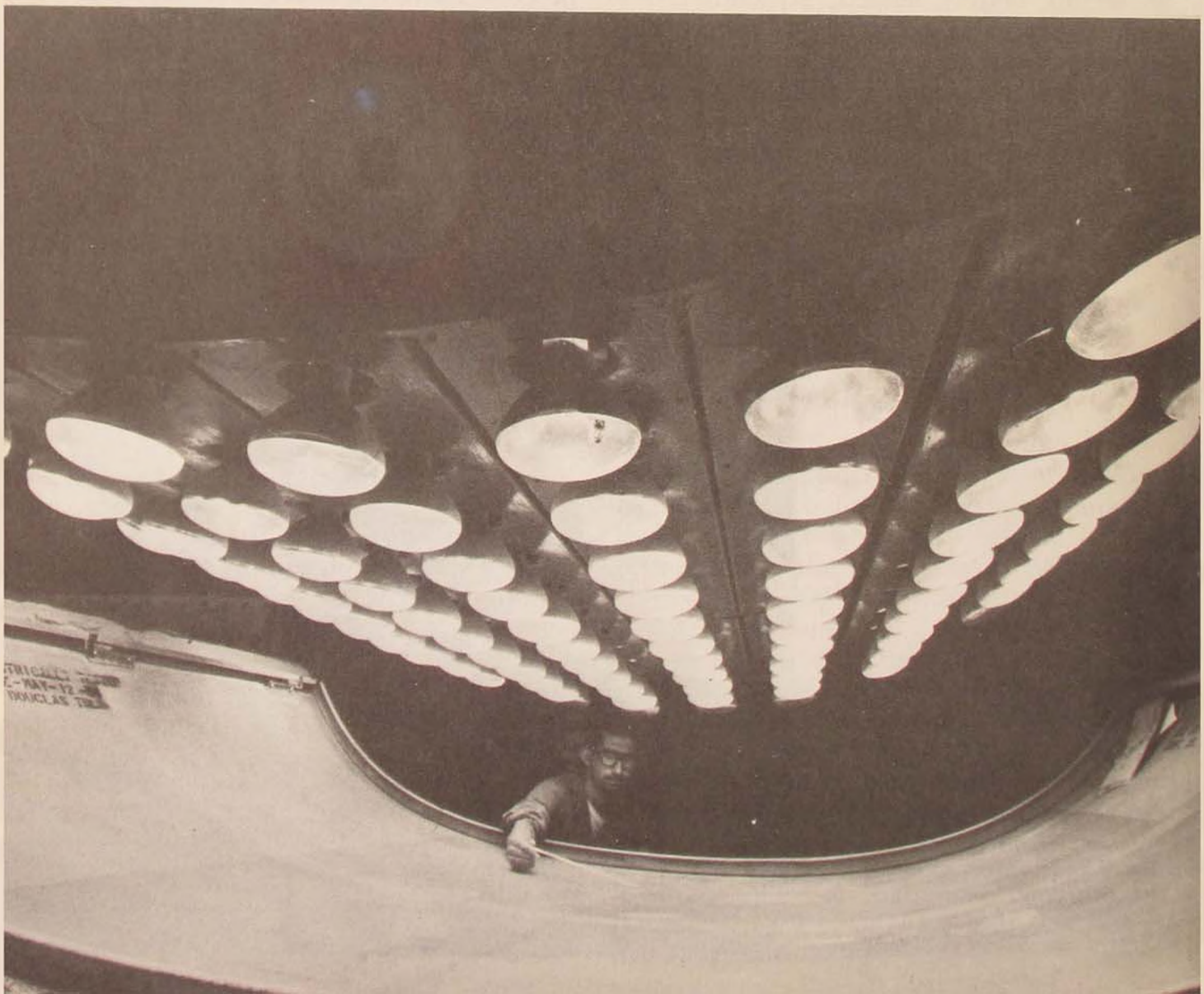


As part of the T-28 modification program, shops at Sacramento Air Materiel Area accomplished the designing, constructing, installing, and testing of a wing pod to carry two .30-cal machine guns.

fication, one might say the old approach was "Logistics, support the design"; now, the approach is "Design for performance and support." ILS also identifies the interrelated elements of logistics: reliability, maintainability, maintenance support, supply support, test equipment, support equipment, transportation and handling, technical data, manpower, training facilities, funding, management data, etc. ILS demands that these elements be core or compositely programmed and managed, to ensure effective and economical support of a system or equipment.

• Life Cycle Costing (LCC)

Closely allied to ILS is the concept of Life Cycle Costing. The objective is to consider fully from the government's standpoint both the cost of acquisition and the cost of follow-on logistics support of an item, in order to make competitive procurement awards on the basis of the lowest total cost of ownership. It is something of a departure from current practices in that as we "tool up" progressively to do it, greater emphasis will be placed on the latter part of the procurement policy, which states "award to the responsible bidder whose bid will be most advantageous to the Government, price and other factors considered." These other factors (operation and logistics support) must



be calculated to provide information so that the competitive award will result in the lowest ultimate total cost to the government as distinguished from acquisition price alone. Thus, we will have to evaluate the acquisition price, the initial costs (item costs to introduce into our inventory, data, cataloging, etc.), and recurring costs (to support the item during its life for management, operation, maintenance, supply, etc.). Different items, reparable or nonreparable, will require different evaluative measures, such as performance criteria, tests, contract clauses, decision formulas, etc. AFLC is currently developing a manual on this complex subject.

An aircraft plastics worker at San Antonio Air Materiel Area checks the lamp temperature (maximum 180°F) used to dry moisture from B-52 radomes. . . . In the SAAMA Maintenance clean room (dust-tight, with controlled pressure, humidity, and temperature) a specialist repairs a piece of electronic equipment with jeweler care.

- Integrated Materiel Management (IMM)

Another management thrust towards bridging operations, support effectivity, economics of investment, and efficiency of management is Integrated Materiel Management (IMM). IMM is the intensive management of selected high-cost and high-investment items through controlled cycles of use, repair, and movement—items such as the Guidance and Control Package used on the Minuteman missile, the inertial navigation assemblies used on the F-4 or F-111, and the TF-39 engine to be used on the C-5. Each of these items has a unit cost in the multihundred-thousand-dollar range. Again, reliability and maintainability are front-end logistics design considerations. For these items, the operational concept, procurement concept, maintenance support concept, transportation/handling concept, and supply support concept must be planned and executed on an integrated basis to ensure optimum readiness/performance and support. These installed items and spares are procured and managed by serial number, with knowledge of status, location, and changes reported on a near real-time basis. Base, depot, or contractor maintenance and support thereto are on an engineered performance and time control basis. As a departure from Hi-Valu management, depot and base-level supply stocks are not procured. Management and support focus on effective use of installs and spares controlled on a tight maintenance turnaround cycle. This concept definitely links the pipeline under central closed-loop management between levels of operations, base maintenance, depot maintenance, and contractor support (if required). It also integrates the functions of operations, maintenance, supply, transportation, communications, and procurement. The inventory manager is at the hub of the system, requiring responsive data and information systems to provide full visibility and program direction. By the end of calendar year 1969 the Air Force will have 21 major items under Integrated Materiel Management—through "brute force" manual/telephonic management control with automated management systems under development.

Harvest Eagle sets enable bare sites to become operational quickly while facilities are constructed.

• Advanced Logistics System (ALS)

Right alongside the development and implementing of the above challenging techniques is the building of the Advanced Logistics System. The objective of ALS is to update and integrate AFLC's functionally oriented management data subsystems from current second-generation sequential computers to third-generation computer management. Here, too, the data, information, and decision-making management systems will process logistics events across functions on an integrated basis. Interfaced closed-loop system design is essential, linking functions and levels (bases, depots, contractors) into an integrated logistics support matrix. The key objective is visibility and management for effective, economical, and efficient utilization of resources for logistics support to the operating forces. It is programmed as a four-year task to be achieved incrementally through 1972.

• Supply Distribution Through Marginal Analysis

Within ALS, we are developing a significant improvement in the distribution of recoverable items. Visibility provided through ALS will enable the Air Force to establish stock levels centrally at bases for recoverable items and direct planned distribution under a "push" system for these important resources. This concept derives from a technique of marginal analysis in a model originally suggested by the RAND Corporation. Now with Air Force base-level standard supply systems on centrally programmed computers and with further refinements to the technique possible through testing and ALS design, both requirements aspects and distribution are being developed. Through use of current-type information for setting levels, employing demand probability tables, and marginal analysis, both levels and assets are "pushed"

to user bases. Distribution of available assets will be made between bases and the wholesale system in such a way that back orders across the system are minimized to secure the optimum readiness/operations posture. This differs from the current system wherein individual bases compute their own levels and direct demands for assets to the depot. The Air Force will establish on a weapon basis the effectivity rate (i.e., how many back orders are acceptable), traded off against the required investment in inventory to support the flying hours and designated major command operating program. Assets will be distributed or rationed, based on availability, to their best use for weapons up-time and readiness. Stock levels are considered optimum in the sense that the expected number of back orders measured at base level would be at a minimum with total assets specified. Of course, NORS and crucial requirements would be handled through expedited "pull" or redistribution actions. Continuing simulation, test, and development work is under way. Major command understanding and approval, as well as Air Force policy decisions in this vital logistics support area, will be major milestones in the near future.

- Joint Logistics Review Board (JLRB)

Telescoping the recent logistics past into a future perspective of major import will be the work of the Joint Logistics Review Board established by Office of the Secretary of Defense in March 1969. The board is chartered to review worldwide logistics support to combat forces during the Vietnam era so as to identify strengths and weaknesses and make appropriate recommendations for improvement. The board consists of senior general/flag officers representing each military service, DSA, and the Joint Staff. The Chairman of the Board reports directly to the Secretary of Defense and the Chairman of the JCS. The board has broad authority in its review and evaluations and is also charged to give particular attention to the major functional and commodity areas of logistics. Definitely, the findings will be a signal event in our business.

Hq Air Force Logistics Command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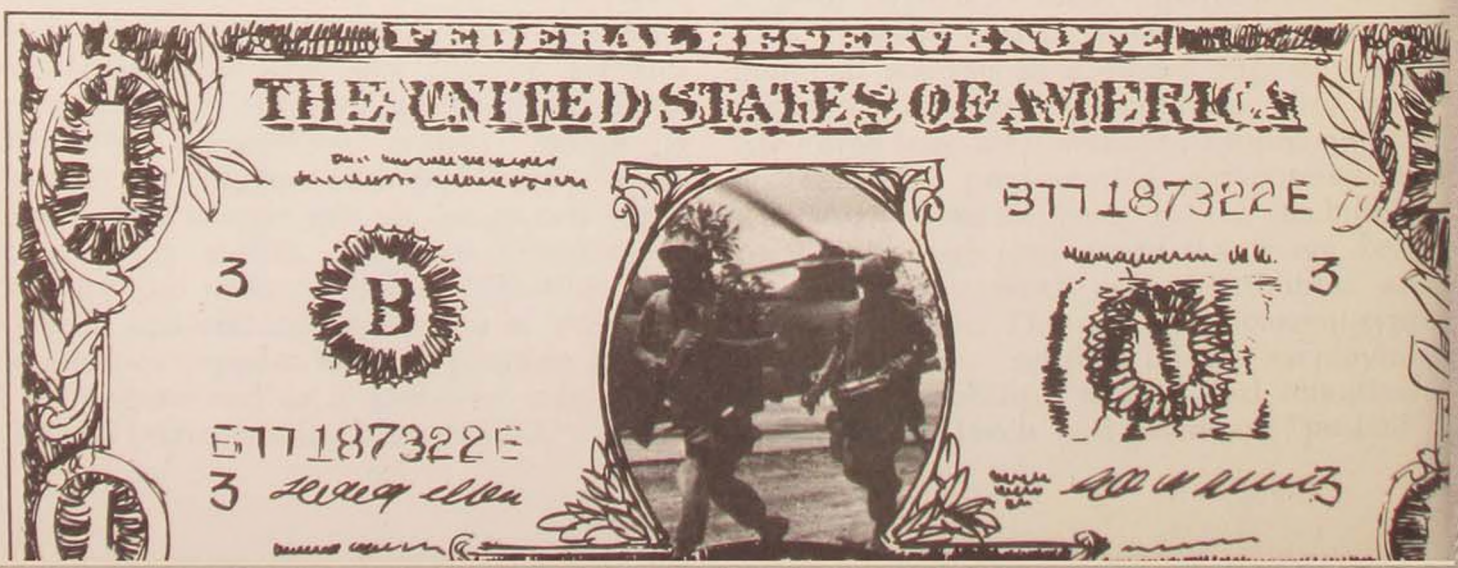
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DOD RESOURCE MANAGEMENT

COLONEL WALTER G. VORNBROCK, JR.

THE fact is self-evident that the wealth and resources of the United States are not unlimited, that an equilibrium is required in the applications of these assets between national defense and other vital national objectives and programs. The ever increasing sophistication and cost of military systems and their operation have emphasized the urgency of acquiring only what is absolutely needed, obtaining these items at the least cost, and consuming these resources with the greatest efficiency consistent with mission effectiveness.[1]

Department of Defense Directive 7000.1, "Resource Management Systems of the Department of Defense," published in August 1966, sets forth the objectives and framework for achieving maximum effectiveness and efficiency within the military establishment. This article is intended to serve as an introduction to the composition and interrelationship of the DOD resource management systems for those whose exposure or experience in this area has been limited.

Resource management systems include all the systems that aid DOD management in its task of assuring that resources are obtained and used efficiently in the accomplishment of DOD objectives.[2] Resources are defined as the manpower, materials, services, and money[3] required to provide the degree of military defense deemed necessary for a given period of time. This definition, however, excludes nonresource possessions such as intelligence, tactical doctrine, military justice, etc. Management is the planning, budgeting, acquisition, use, consumption, storage, and disposition of the resources to achieve the desired goals and objectives. Systems are the methods and procedures used in the conduct of management. Resource management systems affect the entire management process.[4]

Why Do We Need It?

The United States defense establishment has grown from an Army of 46 officers and 672 men in 1778 to the 3,500,000-man, multiservice force of today with worldwide commitments and costing an estimated $70 billion per year to operate. After World War II, the United States recognized that a peacetime standing military force larger than ever before maintained would be required to support its national goals and objectives in the cold war era. As this force grew, the need to further strengthen military efficiency became clear. Wilfred J. McNeil, the first Comptroller of the Department of Defense, set the foundations for improved management by developing the concept of a "performance-type budget," focusing primarily on the financial/budgeting aspects of the comptroller task. Charles J. Hitch, as Comptroller under Secretary of Defense Robert S. McNamara, developed in 1961

the Planning-Programming-Budgeting System (PPBS). This system removed the military budget from its original service-oriented complexion and structured it around a five-year defense plan based upon *mission*-related programs such as strategic forces, general-purpose forces, guard and reserve forces, research and development (R&D), etc. PPBS brought greater strength to Department of Defense influence, permitted better appraisal of the long-range implications of military plans, and defined the five-year cost of those plans already approved. It integrated and brought into focus the plans and programs of the three services. Robert N. Anthony, successor to Mr. Hitch, designed and implemented in 1968 an accounting system that will account for resources used rather than appropriations expended and will permit the managers at all organizational levels to measure the actual cost of each segment of defense against the planned cost of that segment.

A Presidential Memorandum of 24 May 1966 for heads of all executive departments and agencies emphasized the Chief Executive's interest in the development of business-like financial systems throughout the federal government. The Department of Defense response to the Chief Executive's request was the directive on resource management systems, defining them as "procedures for collecting and processing recurring quantitative information that relates to resources and is for the use of management."[5] The systems are basically data information systems, predominantly expressed in dollar terms for the use of management. The DOD directive identified four systems: programming and budgeting systems; systems for management of resources for operating activities; systems for management of inventory and similar assets; and systems for management of acquisition, use, and disposition of capital assets.

programming and budgeting systems

The Planning-Programming-Budgeting System was introduced as an instrument to assist the Secretary of Defense in his management of the military establishment. It embraces two management techniques, programming and systems analysis. These techniques, however, are independent of one another; that is, one can be present without the other. Programming as an activity produces a program or program budget which

> is organized by programs rather than by objects of expenditure . . . classified by "outputs" which are objective-oriented rather than "inputs;"
>
> links to these programmed outputs the resource requirements and the financial budget implications;
>
> extends far enough into the future to show the full resource requirements and financial implications of the programmed outputs.[6]

Systems analysis evaluates possible alternatives of decision, to identify those which achieve a given objective at the least cost or achieve the most at a given cost. Dr. Alain Enthoven, then Assistant Secretary of Defense (Systems Analysis), describes systems analysis as "an effort to define the issues and alternatives clearly, and to provide responsible officials with a full, accurate, and meaningful summary of as many as possible of the relevant facts so that they can exercise well-informed judgment."[7] Mr. Hitch speaks of systems analysis as synonymous with cost effectiveness, weighing the benefits to be gained against the cost that must be incurred.[8]

The introduction of the Planning-Programming-Budgeting System permitted the Defense Department to categorize the defense plans by mission rather than by service, weapon system, or organization. The basic missions or programs are identified as

Strategic forces
General-purpose forces
Intelligence and communications
Airlift and sealift
Guard and reserve forces
Research and development
Central supply and maintenance
Training, medical, and other general personnel activities
Administration and associated activities
Support of other nations.

Each of these is further subdivided into program elements, of which there are approximately 1100. The program elements identify specific types of organizations, functions, or activities (B-52 squadron, Army division, training, X-15 research, etc.) within each major program.

In addition to providing greater homogeneity of the elements to their parent programs, each element is made sufficiently discrete that it is mutually exclusive of other elements within its program. This singleness of output system definition permits a clear-cut chain of relationship to the lowest level of command, i.e., a specific organizational unit. The unit manager is no longer a faceless anonymity.

systems for management of resources for operating activities

The system being implemented under the designation "Project PRIME" (for *PRI*ority *M*anagement *E*ffort) is fundamentally an accounting system. Its two main objectives are (1) to make consistent the accounting data used in programming, budgeting, and management; and (2) to disclose all costs in the conduct of military activities.[9] The need for such a system has been apparent for many years. In 1955 the Second Hoover Commission pointed up the need for an accounting system that would reflect clearly all resources and liabilities and costs of operations, including military pay. The Hoover Commission recommendations were incorporated in Public Law 863 in 1956. In 1965 the House Committee on Government Operations issued a report expressing displeasure at the failure of the federal agencies to comply with the statute and recommended immediate remedial action by them to comply with the intent of Congress.

Mr. Hitch had recognized in 1961 the need for an accounting system that would fulfill Congressional requirements and complement the PPBS, but the task of developing and refining PPBS left no opportunity to develop concurrently a supporting accounting system. The task given Mr. Anthony, when he became Assistant Secretary of Defense (Comptroller) in the summer of 1965, was to develop an accounting system that would identify *all* costs incurred in the performance of each program in the current year's operation of the Five Year Defense Program. Previous accounting systems had focused on funds obligated, comparing them with funds budgeted. Accounting reported the status of appropriated funds to assist officials in avoiding overobligations and resultant violations of the Anti-Deficiency Act, but no formal system existed to account for the cost of resources actually consumed. Changes in the existing accounting system were necessary to achieve this goal. The program elements of the PPBS were redefined to remove ambiguities; investment costs and operating costs were more clearly delineated; military pay was included in operating costs; working-capital funds were extended; and a uniform expense accounting structure for all services was prescribed.

The concepts of PRIME were endorsed by the Comptroller General in a report to the Congress on 12 April 1968, and implementation of Project PRIME was sanctioned by the Congress on 1 July 1968 in the Second Supplemental Appropriation Bill.[10] This accounting system will provide data of greater reliability for programming and budget justification, permit greater emphasis on total expenses rather than bits and pieces, and reflect actual usage of resources in comparison with planned usage, thus encouraging commanders to seek out causes for any variances.

systems for management of inventory and similar assets

An essential feature of the PRIME accounting system is the extension of working-capital accounts to permit a disciplined basis for accrual accounting of operating expenses. Working-capital accounts include stock funds for supply items and industrial funds for service items. Formerly, many items of supply were centrally procured, stocked in area depots, and available to units as needed without reimbursement. Similarly, maintenance requirements that were beyond base capabilities could be returned to area depots for repair without charge. Such gratuitous services were not reflected in base accounting records. Thus significant quantities of supplies and services

were "free" to the consuming organizations. Conversely, supplies were brought into base warehouses and expensed in the appropriation accounting records even though they would not be consumed by a using organization for many months. Many service contracts for vehicle repair, real property maintenance, and utility repairs were recorded as obligations in a given year although the work might not be completed until well into the next fiscal year. By extending the application of working-capital accounts to hold all assets and services in suspense from the time they are ordered until they are received by the final user, the operating expense accounts will reflect only the expense of items consumed but not of items acquired and not yet consumed.

To implement the system for the management of inventories, service depots are being brought under working-capital accounts, supply depots under stock funds, and repair depots under industrial funds. Stock funds finance the purchase of materials and are reimbursed by sales of these items to their customers; industrial funds finance the costs of goods and services for the overhaul, repair, or maintenance of equipment and are reimbursed by charges to the accounts of customers responsible for the costs being incurred. Advantages to be gained from the use of stock funds include better financial item information on inventory levels, obsolescence losses, turnover, etc., and a better assessment by top management of the overall balance between inventory levels and activity levels.[11]

systems for management of acquisition, use, and disposition of capital assets

Forty-one percent of the Department of Defense fiscal year 1969 budget request was for procurement and for research, development, test, and evaluation (RDT&E). With such a share of the defense program going to defense contractors, the Department of Defense obviously has a vital interest in the contractors' capability to achieve planned production and timely delivery of specified quantities that meet well-defined performance criteria.[12] Mr. Anthony described this fourth element as "the process of getting the weapon and support systems of the quality and configuration we need at the lowest cost."[13] Capital asset management systems will provide data for cost analysis and budgeting and historical records for evaluating estimated costs, data on the economic impact of defense spending and a measurement for cost, schedule, and technical performance. Previous efforts to obtain similar information had been plagued by uncoordinated duplications imposed upon contractors for the same information, unreasonable submission dates, excessive detail, and data that were not readily convertible to the form in which contractors' records were kept.

In order to remedy these valid criticisms and yet achieve the objectives of the management system, data collection is being recast in a single program entitled "Selected Acquisition Information and Management Systems" (SAIMS). SAIMS is concerned with those selected acquisitions programmed in the Five Year Defense Program which require research and development funds in excess of $25 million or production funds in excess of $100 million and with those which have a significant price uncertainty or which warrant special attention. The central feature of SAIMS is the use of management control systems developed by contractors to produce information that DOD managers need to evaluate performance by measuring costs, schedules, and technical achievements in relation to plan. Rather than an externally designed and rigidly imposed system, the concept of SAIMS is that the contractor is being given only the basic criteria that his internal system must meet. The standardization of data criteria under one system will overcome the tendency toward system proliferations and will provide better information with fewer reports and better information to support the Programming-Budgeting-Accounting System.

The Blend - How the Systems Integrate

National defense plans are prepared by the Joint Chiefs of Staff based upon the nation-

al objectives and policies enunciated by the National Security Council. Of these plans, the mid-range strategic objective plan, called the JSOP, is the most important for budgeting purposes. It is critically reviewed by the Secretary of Defense and when approved is reflected in the Five Year Defense Program (FYDP). The FYDP reflects the cost of the *approved* defense plans and projects that have been accepted in the total defense program for the next five years. The budget year of the FYDP becomes the basis for the military budget estimate, which, with adjustments, is included in the President's budget request to the Congress. With the funds that the Congress appropriates for national defense, the resources of the Department of Defense are acquired. The management of these resources is the responsibility of the Department of Defense.

We have discussed the four distinct elements (or subsystems) of the DOD resource management systems. Let us now consider how these systems complement and interrelate with one another, recognizing that SAIMS, being concerned with acquisition, will have no significant relationship to PRIME or to inventory management.

relationship of SAIMS to PPBS

SAIMS is a management control system designed to permit DOD to measure the actual cost, economic impact, and progress of the military capital acquisitions against that which was planned and approved in the FYDP. The management systems are standardized in order that they will have a common data base, be meaningful and useful to both parties, and will eliminate the duplications and anomalies that had crept into previous systems. By establishing common criteria for all systems and requiring contractor systems to meet these criteria, the system permits rapid identification of those areas where costs are exceeding plans, work is falling behind schedule, or technical goals are not being achieved. It also provides a historical source for use in refining cost estimates for future plans. The information collected not only provides essential data for updating the FYDP when costs, progress, or technical changes necessitate such updating but also provides improved data for future cost-effectiveness studies. The systems permit both DOD and the contractor to have the same facts in their surveillance over production work in process. Thus SAIMS does have a significant interrelationship with PPBS; it provides both an alarm system for plans presently being executed and a data bank input to be used in developing future plans.

relationship of PRIME to PPBS

PRIME is merely an improved accounting system. It puts the cost data on an expense basis rather than on an acquisition basis. PRIME brings an expense-oriented accounting system to management at all levels and permits each to see for the first time the true costs of operating a tactical or support unit. At the "doer" level where local management needed it, no such information previously existed. By the use of operating budgets that express the planned cost of mission accomplishment, PRIME integrates programming, budgeting, and accounting so that the operating data and management information produced are consistent and interrelated. The system permits the DOD managers and all subordinate levels of management to accurately measure actual costs of performance against planned costs, to identify at the lowest operating level (cost centers) the variances that exist, and to investigate the causes of these variances. With actual cost data rather than standard and prorated figures, the FYDP document will be more accurate in its cost estimates. Justification for budget requests will be more substantive and reliable. The full operating costs of program elements can now be identified.

relationship of inventory management to PPBS

The management of inventory and similar assets is the process of controlling the millions of items that flow through the supply system. Inventories are operating needs, consumable resources that must be charged to or expensed against the using organization if its true costs are to be accurately identified. There is frequently a difference in time, place, and indi-

vidual responsibility between the acquisition of a resource and its consumption. In that interim, the item is inventory or, in accounting terms, working capital. With greater management emphasis on accounting for consumption rather than purchases, the need to expand the use of working-capital funds becomes a necessity. To the extent that working-capital funds are used, the availability of "free" issues decreases, and the proportion of unfunded costs diminishes. Working-capital funds help to focus the attention of operating managers on the resources consumed in their operation. The holding of inventories in stock funds until consumption results in improved management of inventories and a beneficial effect on the PPBS. With improved knowledge of inventory and activity levels, the level of stocks needed to meet consumption demands can be forecast with greater accuracy, a more balanced schedule of procurement can be achieved, and the amount of funds that might otherwise be tied up in higher inventory levels can be released to support other program needs.

relationship of PRIME to inventory management

Inventory management is being strengthened to provide greater control over the vast quantities of supplies and equipment required by the military forces. The use of working-capital accounts not only improves inventory control but is essential to PRIME's objective of accounting for consumption rather than acquisition. The fulfillment of PRIME's need for expanded working-capital accounts resulted in clearer definition of the distinction between expense items and investment items in procurement appropriation. This distinction was long overdue and indispensable for the proper accounting and control of long-lived assets.

THE CONCEPT of planning-programming-budgeting systems and resource management systems is not new or unique. The DuPont company applied the principles of these systems in the early 1920s. General Motors (reflecting the DuPont management influence) has also used these systems in the management of its corporate operations.[14] All highly successful organizations have had strong planning and accounting systems to assist their management in measuring the achievement of established goals.

That the Department of Defense has only in the past two decades emphasized the application of these principles can be attributed to several factors:

- the historical reluctance of the American public to plan ahead for defense prior to the nuclear age;
- the failure of the Congress to provide a workable budget vehicle upon which to operate until the Budget and Accounting Procedures Act of 1950;
- no demand by Congress (as analogous to stockholders) for improved management until the Hoover Commission reports;
- nonexistence of a strong, central leadership to bring competing services to a common mission or program approach until the establishment of the Department of Defense.

What are the strengths and weaknesses of the resource management systems? The strengths or benefits can be manifold, yet, as Mr. Anthony stated, the systems are no more than a collection of procedures, forms, and reports that help the managers do their job.[15] Given good managers, the systems will

—give increased capability without a proportionate increase of resources;

—provide more accurate cost and budget estimates;

—make managers more conscious of costs and motivate them to manage *total* resources;

—further strengthen public confidence in the DOD ability to manage tax dollars;

—bring government and industry into greater harmony and understanding of the problems of each.

On the negative side, the systems will tend to

—further accentuate the centralization of authority in the hands of the Secretary of Defense;

—become a Pandora's box for those who favor accounting for accounting's sake rather than for management, or a basis for proliferation of clerical assistants in accordance

with Parkinson's Law;

—provide more management information than management can profitably digest and thus fall into disrepute.

With the growing concern over the great costs of defense, the management of all resources is an obvious trend. The Defense Department has been in the vanguard in developing unique and often dramatic management innovations. Concurrently the revolutionary effect that the development and growth of computers have had on all walks of life has permitted more rapid appraisal of options than was ever before possible. The Planning-Programming-Budgeting System as used in the Department of Defense was considered dramatic at the time of its introduction, yet today the President has directed its use in all the executive departments, and many foreign countries are applying its principles to their governmental operations. The resource management systems are no different; they are merely a logical extension—refinement, if you will—of the basic PPB systems. As the systems are "debugged," as the benefits accruing become apparent to those outside the Department of Defense as well as those within it, as the very objectives sought are achieved, the benefits of the resources saved will be passed on to the public. The principles are sound. Only improper use of the product can tarnish the acceptance of the system.

Air War College

Notes

1. The distinction between efficiency and effectiveness is that efficiency measures the degree of economy achieved in consuming resources to attain an objective; effectiveness measures the extent to which an objective is achieved.

2. Robert N. Anthony, "Resource Management Systems," *Defense Industry Bulletin*, April 1966, pp. 18–21.

3. "Resource Management Systems in the Department of Defense," Department of Defense Directive 7000.1, 22 August 1966. Hereafter referred to as DOD 7000.1.

4. "A Primer on Project PRIME," Department of Defense, Office of the Assistant Secretary of Defense (Comptroller), November 1966, p. 7.

5. DOD 7000.1.

6. Charles J. Hitch, "Decision Making in Large Organizations," Royal Society Nuffield Lecture, London, 25 October 1966, as reprinted in the Subcommittee on National Security and Internal Operations, *Selected Comment*, U.S. Senate, 90th Congress, 1st Session, U.S. Government Printing Office, Washington, D.C., 1967, pp. 10–17.

7. Alain C. Enthoven, "Management of Department of Defense Programs," an address before the American Institute of Aeronautics and Astronautics and the Canadian Aeronautics and Space Institute at Montreal, Canada, 8 July 1968, as reprinted in *Supplement to the Air Force Policy Letter for Commanders*, August 1968, No. 8-1968, SAF-OII, p. 24.

8. Charles J. Hitch, *Decision-Making for Defense* (Berkeley and Los Angeles: University of California Press, 1965), pp. 43-44.

9. "A Primer on Project PRIME."

10. Albert W. Buesking, "Comptrollership as a Service to Management in the DOD: Recent Developments," *Armed Forces Comptroller*, July 1968, Vol. 13, No. 3, p. 8.

11. "Financial Management Improvement; System Description," a statement of the Assistant Secretary of Defense (Comptroller) to the Comptroller General of the U.S. and the Director of the Bureau of the Budget, Washington, D.C., 1 February 1968, pp. 31–35.

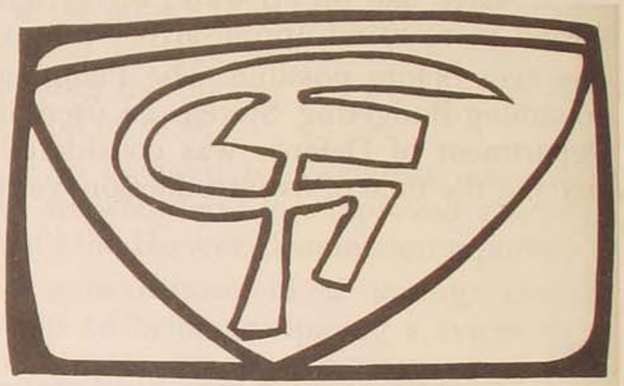
12. Herbert Waldman, "The Specification Approach and SAIMS," *Defense Industry Bulletin*, Vol. 2, No. 10, October 1966, p. 15f.

13. Anthony, p. 18.

14. David Novick, "Origin and History of Program Budgeting," RAND Corporation Paper No. P3427, October 1966, as reprinted in the Subcommittee on National Security and Internal Operations, *Selected Comments*, U.S. Senate, 90th Congress, 1st Session, U.S. Government Printing Office, Washington, D.C., 1967, pp. 28–35.

15. Anthony, p. 18.

Military Affairs Abroad



A NEW VITALITY IN SOVIET "DEFENSE" POSTURE

Variations to "Standard" Soviet Military Strategy

MAJOR WILLIAM T. WILSON

UNTIL 1945, the Soviet Union's overall defense posture since its founding had been essentially defensive in nature and oriented toward the overall support of ground operations. In World War II, air and naval units existed primarily to support the operations of the Red Army. There were no large-scale Soviet strategic air operations, amphibious landings, or carrier operations equating to American operations in the Pacific by U.S. Army Air Force B-29s, Navy carrier task forces, or Marine amphibious units. In a way, it is easy to understand why these types of military maneuvers were never fully developed by Soviet defense forces. Their whole being was ground-oriented with but one purpose—the defeat of an enemy where the theater of operations was the steppes of the western U.S.S.R. and the countries of eastern Europe. There was no overriding need to develop a "deep sea" navy, amphibious forces on the scale of the U.S. Navy/Marine team, or strategic air forces capable of traversing long distances from the Soviet motherland.

The American experience, however, obviously did have a deep influence upon post-World War II Soviet planning. In essence, the development in the United States of powerful nuclear weapons was taken by the Soviet Union to mean it had no alternative but to evolve an offensive capability somewhat along the same lines. The three-year conventional war in Korea had little effect on the long-range outlook of Soviet decision-makers, for by the mid-1950s the Russians were obviously intending to develop their own strategic air force. The Soviet Long Range Air Army (SLRA) was the Russian reaction to the B-47s, B-52s, and B-58s of the USAF's Stra-

tegic Air Command (SAC). For some time it appeared that Badgers, Bisons, and Bears would be built in sufficient numbers to insure parity with the American long-range bomber capability. For military and naval historians, the similarity to the old Anglo-German naval arms race before World War I and the efforts of the U.S., U.K., and Japan to match each other's naval power between the two World Wars must have seemed like the "same old story" all over again.

In the late 1950s, however, Khrushchev saw an opportunity to leapfrog the American strategic advantage. The Russians cut back their production of Bisons and Badgers and never reached equality with their American equivalents, the B-52 and B-47; instead they devoted their energies to an early Initial Operational Capability (IOC) of the intercontinental ballistic missile (ICBM). By the time of the 1960 American Presidential election campaign, the "missile gap" had become a *cause célèbre* and a campaign issue because it was felt that the Russians would be able to outstrip the U.S. long-range missile capability. Soon after the election, however, it was learned that the gap turned out to be a Russian problem. Thus the two nuclear powers arrived at the Cuban missile crisis after they had pursued the historically "boring" course of matching each other (or attempting to match each other) weapon for weapon, with the Russians left in the unenviable position of playing catch-up to American bomber and missile superiority. They were also finding it necessary to seek some successful avenue to combating the American capability in Polaris-type submarines, not to mention the long established American ability to "show the flag" with meaningful naval power. While Marshal Sokolovskii's *Soviet Military Strategy* does give some credence to the use of long-range bombers and the extension of power through the use of naval forces, emphasis was still upon a ground-oriented war on the Eurasian continent in conjunction with massive destruction of the American heartland by the Soviet Strategic Rocket Forces (SSRF).[1] To American Air Force and Navy officers, accustomed to the extensions of power which their individual service missions allow, this Russian concept must have seemed somewhat self-deluding. Even after World War II the Soviets seemed to be oblivious to areas of air and naval development that were considered by Americans as an integral part of a well-rounded military capability. Khrushchev's boasts of an orbital bomb in 1960 were still discounted in the West; they were acknowledged as a possibility in the future. The abortive, yet highly imaginative Cuban venture possibly represented a turning point in Soviet consideration to their overall force structure and its future employment. It is with this apparently new Soviet outlook toward the exercise of world military power that this article is devoted.

Cuba must have been a sobering experience for the Soviet Union. The plan itself was audacious, and had the U.S. shown the slightest hesitation to assert itself the U.S.S.R. not only would have pulled an "end around" deployment of older, shorter-ranged IRBM's (thereby allowing the Russians more contingencies for the deployment of nuclear weapons against their supposed arch enemy) but also would have presented the U.S. with a new and intolerable situation in the delicate balance of power. The U.S. would have also lost the world's belief in its will to employ, when necessary, its vast arsenal of weapons of mass destruction. This latter failing would have opened up all sorts of favorable possibilities for Soviet Communism in its continuous effort to assert itself. But the opposite was the case. The U.S.S.R. was forced to withdraw its gambit.

From this point on, it appears that the Soviet military planners were acutely aware of the disadvantageous imbalance existing in their defense establishment. Characteristically, they set out to right the errors of the Cuban miscalculation. It is almost as though they vowed that if there were ever another Cuba, the Soviet armed forces would not be found lacking. What appeared in Sokolovskii's book was Soviet strategy prior to Cuba, at which time it became obvious how wanting the Soviets were. Here was the U.S. Navy able to marshal its forces to effect a quarantine of Cuba, and the Soviets had very little that could show the "Hammer and Sickle." The

reality of Polaris subs on station; SAC bombers dispersed, ready, and on airborne alert; ICBM's in greater number than the Soviets possessed; carrier forces deployed in the Mediterranean and Pacific; a BMEWS warning capability to negate any hope of a surprise Soviet launch—all gave the U.S. the upper hand. So geared to rapid and varied response was the U.S. military effort that all her forces scattered around the world were brought to an immediate wartime footing, while, for some incomprehensible reason, the Warsaw Pact nations did not come to their highest alert status in order to match the 22 October preparations by the U.S. Something had been lacking in insuring planned alternatives, putting certain types of hardware into the field and reacting with rapid, positive action to any contingency that would face the Soviet Union.

This reasoning—this historical Soviet "defense mania"—is apparently a thing of the past. What has always been the Russian obsession to depend upon a large standing army and the vast space in which to operate seems at an end. The large army is still there, certainly, but the predominant thinking in Soviet defense circles points now to new efforts to insure that the U.S.S.R. is second to none in its ability to carry the battle offensively to any potential enemy. Neither has the idea of a good defense suffered.

Let us consider six weapon systems and force structures and their apparent place in Soviet strategical planning: (1) the antiballistic missile (ABM), (2) the Fractional Orbit Bombardment System (FOBS), (3) large ICBM boosters, (4) Navy Bears, (5) Mediterranean fleet, and (6) "Polaris-type" SSBN's. As we consider these six weapons or forces, let us not forget the large, well-trained Soviet standing army, which can be rapidly expanded in times of emergency. This army reflects the old Russian penchant for big land forces, but it has adapted its tactics to rapid blitzkrieg armored thrusts against nuclear-equipped opponents. Emphasis has been placed upon excellent tanks, self-propelled large artillery, and motorized infantry—all well trained to execute deep thrusts to the enemy's rear during all types of weather, day or night, and to span rivers, as witnessed by the large number of river-crossing exercises (both day and night) performed during Soviet Army maneuvers.

The first four weapon systems we shall discuss seem to reflect a definite effort to achieve a more varied defense posture, all four being areas where the Soviet Union has pioneered new weapon systems or tactics to outflank American capabilities. The last two, more deep-water fleet operations and nuclear-powered submarines (SSBN's), reflect a probable desire of the Russians not to fall behind in areas of worth as proven by U.S. Navy operations in World War II, Korea, and Vietnam and by the use of SSBN's in present-day deployments.

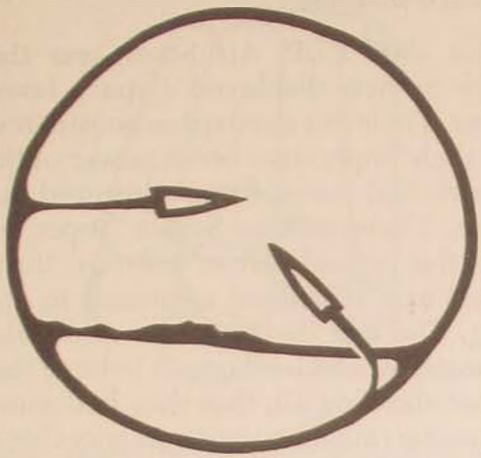
Cuba represented "half time" for the Soviets, and now apparently they are making the necessary offensive and defensive adjustments. They probably feel that the preparations are being laid to "play" the "second half" to a successful conclusion. In terms of the self-imposed six points, how ready and how successful is this latest Russian approach?

the ABM

If we discount the notion that the ABM is mainly a Soviet ploy to help drain us economically, then the idea of an ABM system to guard against a U.S. offensive missile attack seems a reasonable and logical step toward diversity. It is essential that we accept this assumption that the ABM is not merely an economic "weapon." When one considers the relative strengths of the two economies, it would seem more logical for the U.S. to employ this economic weapon. Obviously developed during the time when the first ICBM's were operational and the FOBS was under consideration, the ABM offers the Soviet Union a weapon system that is further along toward operational employment than any counterpart in the West. Certainly the Soviets must also be developing a Multiple Independently Targeted Re-entry Vehicle (MIRV) that could carry not only nuclear payloads but also decoys and penetration aids. With this offensive weapon under development, along with their present and future plans for heavy-payload ICBM's their reasoning would have led them to the conclusion that they must be able to

defend against these same types of offensive weapons that they planned for their own inventory, for surely whatever they could develop was a possibility in the West.

The planning and development of the Soviet ABM most likely were started long before



the U.S. became deeply committed militarily in Southeast Asia—it was considered strictly a military weapon. Its initial purpose was to defend militarily the primary areas of the U.S.S.R., as witness the open press reports of deployment of this weapon system around Moscow and Leningrad. A further incentive to deploy the ABM (if one was needed) could have been the realization of the added burden a like system in the U.S. would be on our budget. A Soviet ABM system would force us to consider, while fighting a costly war, switching from a research and development phase to a deployment phase. Although initial deployment of an American ABM is primarily a counter to a possible early-seventies Chinese Communist ICBM threat, the Soviet planner must chuckle a little as he witnesses this additional drain on our resources and reversal of original U.S. plans based on not having to depend upon a deployed ABM to counter any Russian threat.

The Soviets' development and deployment of their ABM seem to reflect the logical conclusion of a well-thought-out plan in the overall Soviet defense system.[2] While the several factors discussed previously may have been considered before a final decision, the primary consideration of the Soviets was "How do I insure a better defense against American/Western missile delivery capabilities?"

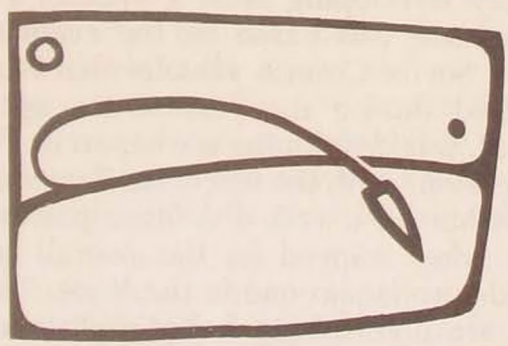
the FOBS

When Khrushchev bragged in early 1960 about possessing a secret weapon, he may have referred to an orbital bomb, but most Western press accounts tended to discount this possibility.[3] The Soviet leader was probably threatening us with a weapon system then only under consideration or perhaps in its initial development stage. The capability was certainly within reach of either the Americans or Russians. We apparently feel this system would not add substantially to our offensive capability, for evidently we have not developed such a weapon and do not intend to.

The U.S. consideration of "cost effectiveness" has not fazed the Soviet programmers. Most likely they feel just the opposite, for Secretary of Defense Robert S. McNamara stated on 3 November 1967 that the Russians were possibly developing such a system. His announcement was based on the evaluation of several Soviet Cosmos vehicles that had been launched during the year. Once again the U.S.S.R. was developing a weapon that would insure, along with the rest of the Soviet defense establishment, a varied defense posture. The FOBS, when viewed in the overall picture, should surprise no one in the West. The Russians are not rushing helter-skelter into development of all these varied weapons and force structures. Like their space exploits, these developments reflect a carefully considered program, capable of employment and obviously styled to suit their needs, preferences, and plans.

Any possible Soviet knowledge of the U.S. program to develop an over-the-horizon radar has not dampened the Russian idea that the FOBS would be an effective system worth having in their inventory. Even though this delivery vehicle is regarded as less capable than the ICBM for carrying heavy warheads, it should not be forgotten that the Soviets' capabilities and intentions have been misjudged before. Perhaps they will develop a powerful thrust system (probably through clustering of present

rocket boosters) that will enable FOBS delivery of high-megaton (MT), heavier warheads—warheads larger than anything in the West. If they do, their venture in this weapon system area would be valid. It would offer them delivery capability via the Southern Hemisphere, thereby outflanking our three BMEWS stations and other radars. The idea of delivering FOBS via this route probably resulted from Soviet scheming in the late '50s and early '60s looking toward a "super" ICBM to deliver warheads on the U.S. undetected. Two arguments against development of such a tactic —inaccuracy and small on-target MT capability—were probably valid and considered by Soviet decision-makers. Their method of circumventing these disadvantages apparently is the FOBS. In mid-November 1967, two Soviet Strategic Rocket Forces generals tended to confirm Secretary McNamara's statement of 3 November. Colonel General Nikolai V. Yegorov, Chief of the Political Department of the SSRF, made



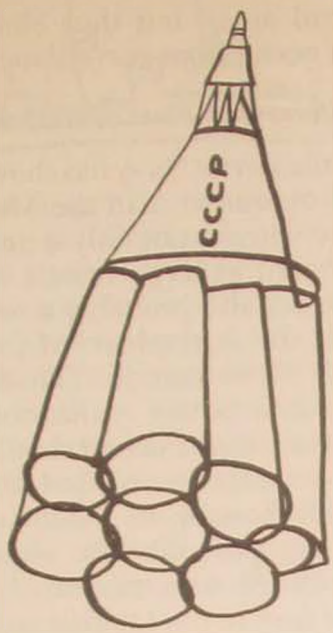
references to a rocket that was about 110 feet long and 10 feet in diameter and capable of "unlimited range, pinpoint accuracy and flight-trajectory parameters that make nuclear-missile blows sudden. and unavoidable." Similar descriptions were made of a probable FOBS by Marshal Nikolai I. Krylov, Commander-in-Chief of the SSRF.[4]

The FOBS offers the Soviets a solution to getting around our BMEWS. While it is not the most accurate or economical weapon system, it does add to the variety of their delivery systems. It seems to fit in as one of several solutions to the Soviet strategists' problem of insuring the highest degree of success in any possible nuclear war. It tends somewhat to disregard good economics practices, but the Russian defense establishment is obviously more interested in results than economics, and the FOBS is funded accordingly.

large ICBM boosters

The 1967 Paris Air Show was the first time the Soviets displayed a space booster to the West. Their standard space booster revealed where their impressive boost power of the past ten years had come from: clustered, smaller boosters. There was no Soviet "super" rocket, merely the typical Soviet solution through a practical and simplified approach to problem solving. The fact that we were allowed to see this booster would lead one to believe that they were not showing all, that they had something either in the inventory or on its way that would lift even greater weights.

I mention these large ICBM's only to point out how the Soviets go about solving problems of defense more often by the simplest method available rather than depending on development of more intricate, sophisticated hardware. For them the practice was a boon. In the mid-1950s, when the U.S. was the acknowledged leader in miniaturization, the Soviets merely developed greater boost power because they lacked the smaller component parts available to the U.S. This forced them to develop larger warheads. The end product was an ICBM capable of delivering larger on-target megatons, without any apparent loss in accuracy. Thus, "hindered" by their seeming inability to "keep up" with the U.S., the Russians achieved an additional benefit from their ICBM development in that larger warheads meant increased damage with one missile. Also during the mid-1960s to early 1970s they possibly can mix the load of their warheads with nuclear bombs, decoys, and penetration aids. Press pictures of the SS-9 that was displayed in the 50th Anniversary Revolutionary Day parade credit it with a possible 20-MT payload capability. It is a gigantic missile, reflecting the old Russian predilection for bigness, and it answers the question of Russia's ability to put the "product on the market."

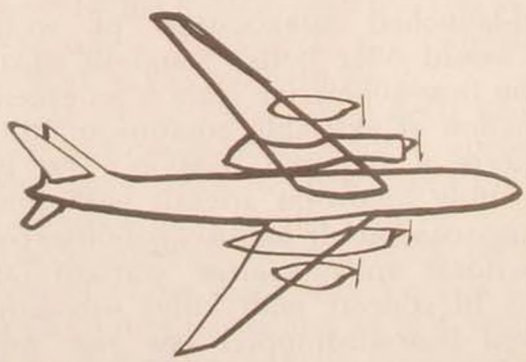


Most likely the Russian approach to bigness in the development of ICBM's and space boosters has not changed much since the mid-1950s, when they lacked miniaturization. Today they continue to develop large boosters because they provide a versatility not duplicated by any other power (though we have solved the problem with a large Minuteman force supplemented by the Polaris—and soon the Poseidon). The Russians' large boosters enable them to deliver payloads from different directions at longer ranges, should they opt for this less desirable alternative. Who is to say that in the destruction and chaos of a nuclear exchange in a general war the delivery of heavier warheads rather than lighter "dirty" payloads and the change from a North Polar launch direction to a Southern Hemisphere approach might not tip the balance from defeat to victory? Lack of accuracy discounts this delivery against underground hardened sites, but against targets requiring less accuracy it could lay down vast clouds of radioactive materials, endangering the majority of our civilian population, and thus be an excellent terror weapon during any delicate diplomatic discussions.

Soviet Navy Bears

A current purpose of the Bear is reported to be reconnaissance against the various carrier task forces of the U.S. Navy.[5] Although that may seem to exaggerate the mission possibilities of this rather outdated aircraft, it may be another example of a simple and inexpensive solution to a Soviet problem: how to keep American carriers under surveillance without like counterforces. It is not the best solution, but it fills the bill until something better comes along. In early 1963 press reports began to reveal how Soviet Badgers and Bears were performing reconnaissance missions against U.S. and NATO naval forces during exercises in the North Atlantic. Such flights have now become routine in several theaters of the world. This may have been the beginning of a new concept in Soviet planning—and as a direct result of the Cuban crisis. One can almost imagine the Soviet planners stating the problem in a staff study: "How to counter the threat of American carriers."

The Soviet Navy was obviously not yet ready to challenge the "deep-blue" vessels of the U.S. As a stopgap measure, long-range reconnaissance by the only aircraft capable of the mission, the Bear, did offer some interesting possibilities. If the Soviets always knew from the Bear's information the whereabouts of American carriers, what was to prevent attack either by tracking submarines or by the launching of large megaton missiles based in eastern Europe, on the Kola Peninsula, or in



southern Russia against carriers in the Mediterranean or the North Atlantic/Norwegian Sea/Barents Sea areas? The same principle applied for missiles that might be stationed in the Maritime Province or on the Kamchatka

Peninsula for attack against carrier forces in the western Pacific. The time involved between notification, launch, and impact would require real-time operations and extreme accuracy in delivery of large warheads to insure destruction or at least incapacitation of possible carrier launches. Even in real-time sequence, a carrier might be as much as 12 to 15 miles from its last reported position, so the Bear would have had to give accurate cruising speed and direction of the carrier to insure successful results.

Another possibility is the delivery of improved air-to-surface missiles (ASM) from Bears or Badgers. The fleet air defense forces should be able to contend with this problem. If the purpose of the Bear reconnaissance is merely notification of positions of American vessels, this mission can be continually performed unhindered in peacetime. During hostilities, ASM attacks by Bears become somewhat unrealistic; but if they continually fly peacetime reconnaissance missions against our carriers, their employment on one of these "established and routine" missions during a well-planned, coordinated attack by all Soviet offensive weapon systems might be neither unrealistic nor ineffective.

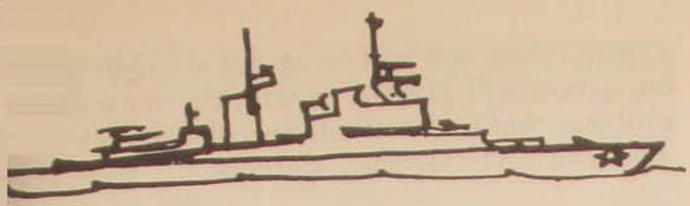
Submarines could launch any variety of weapons once they were properly positioned by Bear reports—torpedoes, missiles, or missile-torpedoes (something like a submerged-launched SUBROC-type of weapon which would offer better stand-off capability). The Bear-submarine team is an excellent combination of available equipment utilized to perform a required mission. The Bear and possibly follow-on aircraft with similar long-range combat-air-patrol capabilities could also perform antisubmarine warfare (ASW) missions in concert with killer submarines. Improved Bear-airdropped ASW gear would enable the Soviet Navy to cover greater areas of ocean in relatively short time, not to mention continual surveillance of "positive contact" Polaris submarines. If this seems unrealistic, one might consider that the thoroughness of present and possible future oceanographic surveys by the Soviets should enable their naval experts to predict probable Polaris patrol areas and thus eliminate great expanses of ocean from surveillance.

Soviet Mediterranean Fleet operations

While the Soviet Navy has shown increased vigor in all oceans, it is in the Mediterranean that we now witness not only a new vitality in the employment of large vessels in fleet-sized deployment but also probably a new appreciation of what the equivalents of the U.S. Sixth and Seventh Fleets can do. This development represents a new Soviet realization of the important missions that can and should be accomplished by naval forces. While Cuba may have initiated such thought, the Arab-Israeli war in June 1967 was probably the clincher. Never before have the Soviets continually operated a warm-water fleet in the Mediterranean, as they apparently intend to do now for the foreseeable future. True, they did have submarine bases in Albania before the Soviet-Chinese rift, but this was only one aspect of fleet operations. Possibly the lessons of the Sixth Fleet during Lebanon and that force's presence during the Egyptian defeat showed the Soviets the necessity of a permanent presence in this all-important sea.

It is important to view these Mediterranean operations in the light of the mission they accomplish in support of general-purpose forces. Presently and for the near future, the Soviet Navy seems interested in building a capability to support limited-war objectives. The military showing of the "Hammer and Sickle" in the Mediterranean is a reality, but its overall value is probably greater as a propaganda weapon than as a viable military force. As R. W. Herrick has stated in his *Soviet Naval Strategy*, the Soviet Navy is still essentially a defensive force. One military mission will probably be the development and perfection of an ASW force around the two new amphibious assault (LPH-type) carriers *Moskva* and *Leningrad* and any follow-on ships of this class. The recent six-week exercise of the *Moskva* in the eastern Mediterranean showed the keen Soviet interest in operating against Polaris-type submarines.

The significance of the Mediterranean Squadron lies not in its immediate military capability or propaganda value but in the im-



plication of a new Soviet approach to the use of sea power. Obviously the resupply of Nasser's destroyed military forces offers the Soviets leverage in obtaining Egyptian naval and air facilities to support this Mediterranean task force. The long-cherished dream of operating south of Turkey and Persia (Iran) may soon become reality. It is not for naught that this fleet is on station or that the Soviets apparently became involved in both airlift supply and the flying of operational missions in the Yemeni fighting during the latter half of 1967.[6]

Are the Soviets eyeing the seas south of the Suez, the Indian Ocean, and the Straits of Malacca? The establishment of a strong Soviet influence in these areas would greatly enhance the operational capabilities of their growing fleet through cooperation between units of the Black Sea Fleet/Mediterranean Squadron and the Pacific Fleet. What will unfold politically is a matter of conjecture, but the reality of Soviet force in the Mediterranean is also a warning: on the face of it the U.S.S.R. intends to contest the United States Navy on the high seas of the world.

It would seem that the Mediterranean is both a proving ground and an initial theater where we can expect to have to contend with a formidable opposing naval power. The Soviet Navy has "gone to sea" no matter what Messrs. Sokolovskii *et al.* stated in *Soviet Military Strategy* in 1962. The basic mission was outlined in that work, but the emphasis upon the methodology and variety of naval operations has certainly changed. It probably will not be many years before we can also expect to be contending with strong Soviet fleets in the Atlantic and Pacific—fleets far more powerful than the forces presently there and composed of the most modern types of combat ships: destroyers (both DDG and DD types), guided-missile cruisers, submarines (SS's, SSN's, SSBN's and SSK's), and, possibly in the next decade, aircraft carriers (CVA's and/or CVAN's).

Although the Soviet Mediterranean Squadron should probably be viewed as both an extension of power and a proving of naval ability and tactics, only time will confirm the intentions of the U.S.S.R. The primary purpose of naval power is to gain and maintain supremacy of the seas. Only the future and later history can possibly confirm the American view that the attack carrier is the capital ship to maintain this supremacy, as opposed to the apparent Soviet view that reliance upon SAM- and SSM-armed cruisers and destroyers can act as the guarantor of final domination of the world's oceans. Until the Soviets build attack carriers also, it is difficult to view their Navy as a meaningful offensive force for use in a general-war environment.

In October 1967, Vice Admiral William E. Ellis, Chief of Staff of the Supreme Allied Command, Atlantic, stated that the Soviet Union was building its first carrier. The mission of this carrier was thought to be either for ASW helicopters or helicopter assault forces.[7] The next logical step would be carriers to handle high-performance aircraft. This is the only major type of unit lacking today in the Soviet Navy, and it certainly is the logical follow-on weapon system to accomplish missions now being carried out by Bear aircraft. Carriers would offer the Soviets an even better opportunity to put visible evidence of force on the scene in theaters of operations never before contemplated by the Russian military. The Mediterranean offers the Soviets the opportunity to outflank NATO's southern wing.

As stronger and larger fleets gain experience in sophisticated, modern operations far from home ports, the new "deep-blue" Soviet Navy will acquire greater ability and confidence to accomplish its mission. While the development of a true "high seas" navy is not predicated on new technology or new weapon concepts, it does once again underscore the Soviets' ability to offer their defense establishment a great number of choices, a willingness to forsake old concepts, and the readiness to recognize a good thing when they see it.

Soviet "Polaris-Type" SSBNs

The Americans have shown the Soviets the

way when it comes to the development of this particular naval weapon. Imitation is supposedly the sincerest flattery, and the U.S.S.R. has indicated what they think of SSBN's by employing them as rapidly as possible. Discussion of this type of delivery vehicle can remain very limited because Soviet defense planners realize the added capabilities that SSBN's allow them among the different alternatives they would like to have available for putting nuclear warheads on target.[8]

It will no doubt take the Soviets several years to accrue the necessary numbers of SSBN's and the experience to operate this type of weapon in a highly professional manner. In view of their ability to reach goals sooner than we had forecast, it probably will not be long before they reach their SSBN goal. There is no reason to assume they will not be able to duplicate Polaris by the early 1970s, if not sooner. Then this system at full strength and on station will present us with the same ASW problem that our present fleet of Polaris subs gives the Soviet defense strategist.

THIS ARTICLE has been limited to six areas of weapons and forces. The discussion has covered the more prominent problems facing U.S. Air Force and Navy planners today as a result of a seemingly new approach to defense problems by those who establish Soviet military goals. Also, I would like to leave this thought: The Soviet approach to problem solving often seems simple, but it is very versatile and effective.

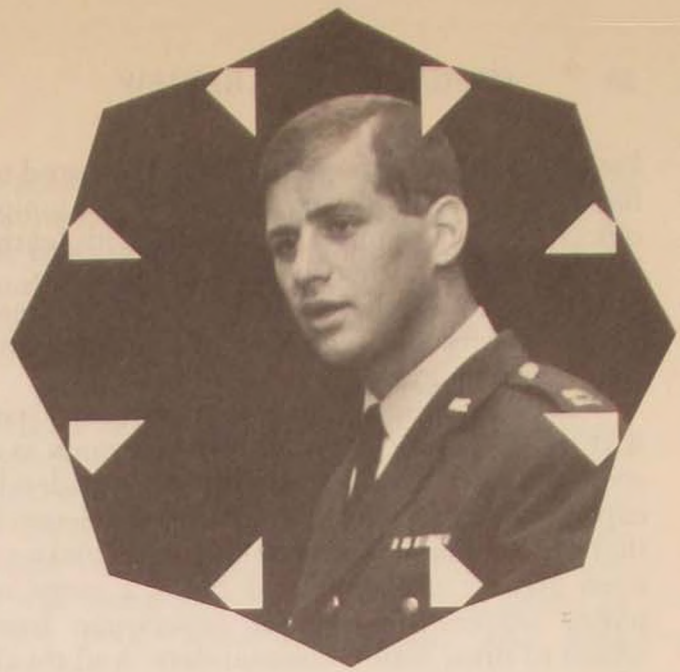
In the beginning I posed the question, "How ready and how successful is this latest Russian approach?" The Russians are leaving no stone unturned in developing as varied a defense establishment as possible, and it appears that they have given equal attention to defensive and offensive weapon systems. It is for us to be constantly aware of possible new technological developments, new weapon systems, and new tactics. We must be prepared in the future to contend with an opponent who has shown he intends to be second to none when it comes to the defense of his homeland.[9] While the Russian military hierarchy may have its roots deeply imbedded in the thought and experience of land warfare and general forces, there seems to be little doubt that new ideas, new weapons, and new leaders are entering the Soviet scene.

United States Air Force Academy

Notes

1. V. D. Sokolovskii, ed., *Soviet Military Strategy* (Englewood Cliffs, New Jersey: Prentice-Hall, 1963), p. 338.
2. "Sowjets zielen auf absolute Ueberlegenheit," *Die Welt* (Hamburg), 13 March 1968, p. 1.
3. U.S. Senate Committee on Aeronautical and Space Sciences, "Soviet Space Programs: Organization, Plans, Goals, and International Implications," 87th Cong., 2d Sess. (Washington: U.S. Government Printing Office, 1962), p. 52.
4. "Orbital Missile Hinted by Soviet," *New York Times,* 19 November 1967, p. 15.
5. "The Soviet Thrust," *Aviation Week and Space Technology,* 13 November 1967, p. 21.
6. "Soviet Comeback as Power in Middle East Causes Rising Concern in West," *New York Times,* 15 January 1968, p. 1.
7. "Russians Building Aircraft Carrier; Policy Shift Seen," *New York Times,* 23 October 1967, p. 1.
8. "Soviet Missile Submarines on Patrol Off U.S. Coasts," *New York Times,* 10 May 1968, p. 3.
9. "Creativeness in Total Defense," Anthony Harrigan, *Military Review,* July 1968, p. 12. "The rethinking of our needs is, of course, a mission for the US military services inasmuch as the basic role of the US Armed Forces is to insure the survival of our society."

In My Opinion



BROAD BASE EXPERIENCE PROGRAM FOR THE CAREER JUNIOR OFFICER

CAPTAIN GERALD W. MUSSELMAN

LIEUTENANT GENERAL Horace M. Wade, when he was Deputy Chief of Staff, Personnel, at Headquarters USAF, stated:

> For the most part the young man entering the Air Force today is a highly educated, sincerely motivated young man embarking upon a career of his discerning choice—full of ambition, full of energy—eager, aggressive and imbued with hope. Too many of these young officers are poorly received, poorly treated, inadequately counseled, and somewhat ignored to such a degree as to frustrate their ambitions and void their good intentions.[1]

The dissatisfaction which inevitably results has two deleterious effects upon the Air Force, one immediate and one long range. The immediate effect is obvious. A junior officer starting at the bottom, unfamiliar with the military as a whole and then pigeonholed in a slot where he can do the least amount of damage, often has even his strongest spark of imagination stifled. The junior officer with too few demands upon him can experience little job satisfaction and soon becomes disenchanted, demoralized, and completely ineffectual. As there is no escape, this evolves into bitterness toward the Air Force, which in turn permeates those working for him. The effects are obvious—a bitter officer, disgruntled men, and finally an inefficient operation. Who suffers? Not the junior officer, particularly, as he will separate at the first opportunity. The Air Force is the one that stands to lose original ideas, aggressive leadership, and improved efficiency.

There are two groups of junior officers to consider: those in one group are merely fulfilling their service commitment and will separate upon its completion, and those in the other are either undecided or have definite plans for a service career. Both will have an immediate effect upon the Air Force. However, I will restrict my discussion to the second group, those who have made definite plans or might be receptive to an Air Force career. This group not only has an immediate effect upon the Air Force but has a long-range effect also.

Well, what is it that makes a new second lieutenant so potentially dangerous? This question could be answered by the old hands in any number of ways. However, I feel it all boils down to the "experience gap," the knowledge of how the Air Force as a large organization functions. Be this junior officer a product of OTS or AFROTC, his knowledge is often

limited to what he has read or had lectured to him in class. A goodly percentage of the junior officer's first 18 months is taken up with learning "Air Force" rather than a particular job.

How could the Air Force benefit these junior officers and increase their potential as future commanders?

Let's first make some assumptions. First, that the 18 months a junior officer spends as a second lieutenant does not pay the dividends expected for the money expended. Second, that the Air Force would be willing to make an even greater investment to build a corps of junior officers broader in experience from which to draw future commanders. And third, that the Air Force would be willing to expend the time and money required to plan and implement a new management improvement program for the junior officer.

The program which I offer is merely an idea, an overall plan, no nuts and bolts. To finalize such a program would take extensive planning regarding facilities available, which I am unable to give. This program could include not only CONUS facilities but also larger Air Force bases worldwide.

Before the days of Air Force Specialty Codes (AFSC), a junior officer gained valuable experience in all parts of the military machine with a tour of duty as an adjutant. Here he actually worked with the nuts and bolts, i.e., finance, headquarters squadron, administration, personnel, supply, etc. Major General Avelin P. Tacon, Jr., has spoken of the varied experiences of an adjutant:

> As a squadron supply officer you became acquainted with supply and materiel. Today, supply is a highly specialized field, and certainly no man, unless he has spent years in the business, can speak technical language and give the details that the supply people can. But a commander should know enough about supply so that he can speak intelligently about it and discuss it with his technically proficient supply people.[2]

General Tacon further stated that the squadron commander gave the adjutant diversified tours, after which

> when the young fellow's turn comes to command a unit, he has had administration, supply, maybe he has been a squadron engineering officer or a squadron operations officer, and he has a well-rounded background. When he takes over any unit, he knows what is going on. One of the prices we pay for the AFSC system today, in my opinion, is we forfeit this type of training for a young officer.[3]

As we no longer have the adjutant position, this experience opportunity has been lost. How does the junior officer gain this experience today? Some are exposed to it by chance, while a few luck out and have varied experience early in their career (e.g., an aircraft control and warning squadron). However, the majority of junior officers never receive this experience.

For the Air Force to have leaders tomorrow, we must glean the willing, energetic, and imaginative junior officers today and train them. Lieutenant General Ira C. Eaker has stated:

> Undoubtedly one does inherit the physical and mental building blocks for leadership, but the business of forming these into outstanding qualities for leadership seems to be acquisitive, the product of individual effort, the surrounding climate, the chance of circumstance.[4]

As far as the junior officer in the USAF is concerned, something could be done to assist the "individual effort" and "chance of circumstance." This would be a program to give the new second lieutenant broad and varied experience in military functioning not unlike the old adjutant experience.

This program would have the support of all echelons, from Hq USAF down to base level. For a period of 18 months, before the junior officer was assigned to a specific command or specialty school, he could enroll in a voluntary program to broaden his experience.

The areas of experience that I shall suggest will cause argument by some, I know. However, I feel these to be basic; with an overall knowledge of how these areas function, the junior officer will have no problems later in broadening and deepening his understanding. Discussion will also be raised as to the order in which I list these areas. With some it makes

no difference which comes first; with others I feel it does. Legal definitely should come before headquarters squadron, and IG experience should be last, to wrap up the previous training.

The areas of experience that I suggest are listed in sequence, with a suggested length of training for each, to comprise approximately 18 months:

Months experience	*Area of experience*
1	Personnel
1	Finance
1	Tranportation
3	Supply
1	Food Services
2	Civil Engineering
1	Base Communications
2	Legal
2	Hq Squadron
3	IG

Each Air Force base has all these areas, ranging in size, from which the junior officer could gain experience. The program would not aim to produce a technician in all these areas, but, as General Tacon states, he could "speak intelligently about it" and understand the functioning and problems involved.

Let's pick Second Lieutenant Joe Jones after graduation from OTS and follow him through such a career program, to see how it might work.

Lieutenant Jones entered OTS with a career specialty assigned—we will say communications. Normally right after graduation he would PCS to 3031 school at Keesler and then to his first assignment in the field. However, Jones wants to make a career of the Air Force; he is energetic and inquisitive; he has the potential to become an outstanding commander; and he elects the career program.

After graduation, he is assigned to XXXX Air Base Group at a CONUS base, where, under the direction of a program counselor, he will be trained in the above areas.

The Air Base Group assigns Jones to the CBPO or the personnel section of an organization on base, for his one-month training experience. Here he will begin obtaining a broad knowledge of the hows and whys of orders, assignments, and records. After the month is completed, a short evaluation is returned to the counselor, who will compile it with others from each area when he prepares a training evaluation at the end of Jones's 18-month experience training.

After Personnel, Lieutenant Jones will spend a month at Finance and one at Transportation. At Finance, he will gain a broad understanding of a subject near and dear to us all—pay and allotments—how finance operates, various funds, etc. At Transportation, he will touch base briefly with such things as motor pool, household goods, and hold baggage.

Before I go further, I will agree that Lieutenant Jones could obtain a certain amount of knowledge of all these areas from reading, either in OTS or AFROTC. However, I feel the practical experience in these areas, even for a month or so, would present a clearer "big picture" to him and by doing so build self-confidence and initiative. An additional 18 months' training is a small price for the Air Force to pay for future aggressive leadership.

Supply being such a vast area and so important to the functioning of any organization, Jones will spend three months there. When he has completed his supply training, as I have said, he will not be an expert; but afterward supplies, spares, NORS items, and E-AID won't throw him for a loop and he will be able to ask intelligent questions.

Following his tour at Supply, Jones will go on to Food Services, Civil Engineering, and Base Communications.

One word of explanation on what I mean by Base Communications. With regard to Jones's training, this would encompass Base Message Distribution Center, Base Communications Center (originating and terminating administrative traffic), and the Base Telephone Center. With a knowledge of how administrative messages (incoming and outgoing) are processed, Jones will have few problems when he later deals with command and control communications. He will also understand that many of his so-called communications "problems" are merely management situations which can be readily solved.

Like Supply, Legal is a vast area, but while there Jones will observe firsthand many of the problems he will encounter later on with his own personnel. Watching special and general courts-martial and being advised of the various duties involved with these matters will surely beat his reading the "manual." After two months at Legal, he won't be a Perry Mason, but he will be a more intelligent officer in the USAF and a much wiser commander later on.

To further broaden his understanding of personnel problems and personnel management, Jones's next two months will be with a headquarters squadron commander or, if that is not possible on the base where he is assigned, with the 1st sergeant of a large organization.

No one knows or can completely appreciate the innumerable problems that arise for a commander in carrying out his responsibility to his men. It is all well and good to read about looking out for your airmen's health and welfare, but a tour with the headquarters section will point out vividly many situations and problems involving personnel from which a young officer can draw throughout his career.

Finally, Lieutenant Jones will spend three months with the Inspector General. It is here that many of the loose ends can be tied together through working with the AFR 123 series inspection system. With his previous 15-month training and a tour with the IG, he should be much more flexible in any situation where he finds himself in the Air Force, and he has gained invaluable experience toward his future career.

With his 18-month training completed and a broad military experience base on which to build, the lieutenant is now ready to go on with his specialist training, 3031 school in this example, and then out to the field, not only trained in his specialty but self-confident and experienced in the functioning of the Air Force as a whole.

Briefly let me reiterate my suggested program:

- It would be purely voluntary.
- It would be for 18 months' duration, divided into major experience areas.
- It would be Air Force-wide, not limited to specific commands.
- It would be prior to any specialized training.
- It would be under the direction of Air Training Command, with local training counselors at participating Air Force bases' field training detachments.
- The junior officer who elects this career program would have his active duty service commitment date adjusted in accordance with existing policy on training.

As I have stated, when the junior officer who elects this program has finished his specialized training and been assigned to the field, the USAF will have not only a more enlightened junior officer but one who is highly motivated and ready to begin immediately in the position for which he was trained.

The USAF will also benefit in that there will be a pool of these officers, broad in experience early in their careers, from which to draw for future commander slots.

Compared to the number of years' service of a career officer, the 18 months is a small amount of time. For the benefit which will accrue to both the officer and the Air Force, this training will indeed be a small price to pay.

With the tremendous growth the Air Force is experiencing and the vast amount of specialized training needed today, the Air Force cannot afford to leave tomorrow's commander's experience base to chance. It must be planned and directed today.

1961st Communications Group (AFCS)

Notes

1. Lieutenant General Horace M. Wade, USAF, Statement before Special Subcommittee on Enlisted Promotion Policy, Committee on Armed Services, House of Representatives, Washington, D.C., released 16 August 1967.
2. Major General Avelin P. Tacon, Jr., USAF (Ret), lecture, "The Tactical Commander," Air Command and Staff College, Air University, 20 October 1959.
3. *Ibid.*
4. Lieutenant General Ira C. Eaker, USAF (Ret), lecture, "Some Observations on Leadership," Air University, 17 March 1961.

SPECIALTY OPTIONS: FOCUS FOR CAREER PLANNING?

CAPTAIN CARL R. OLIVER

A FAMILIAR saying, "Do as I say, not as I do," calls attention to our not infrequent human failing to make our actions coincide with our description of the way people should behave. The results of polls and surveys tend to be quite unreliable because of this failing. When people give misleading, erroneous answers to questions about how they behave, it may be for many reasons. They may not understand themselves very well, they may not explain their behavior very well, or they may have private reasons for intentionally giving wrong answers. In view of this problem, researchers try to develop means for supplementing or bypassing polls and surveys: means which will permit direct study of how people behave—what they actually do, not what they say they do.[1]

Opportunity to study what people actually do in planning their military careers occurs each year in Air Force ROTC. Shortly before the date on which commissions are awarded, AFROTC cadets select the three Air Force specialties they most want for their initial duty assignment. A complication is that the specialties must be in three unrelated career areas. Thus a man whose prime interest is flying may list "Pilot" as his first choice, but for his second and third he must choose two distinctly different specialties, for example "Intelligence" and "Personnel."[2]

These cadets stand in a unique, flexible position vis-à-vis the Air Force. They have no Air Force work experience to shape their thinking, no previously assigned specialty to channel them toward specific jobs; yet they have opportunity to request assignment to the jobs that hold most appeal for them. They are asked to make crucial decisions about their future lives and careers. They are not asked to consider a hypothetical situation and explain what they would do *if* . . .; what they are asked to do will actually shape their futures. This procedure permits study of the considerations they actually use, the factors they consider most important in career planning at this point in their lives.

Late in 1968, 24 AFROTC cadets at Stanford University, California, undertook this task. Each was told to prepare a report identifying the three specialties, in different fields, which he considered most appropriate for him. He was to study the requirements of the specialty, as listed in Air Force Manual 36-1, and show how his academic experience, work experience, or other qualifications met the requirements. In addition, he was to discuss his personal interest in being assigned to the specialty. The cadets were told that these choices would be part of the information considered by the Air Force in designating their initial active duty assignments and that they probably would be very influential.

The cadets prepared their papers very carefully. Without exception, they spent considerable time studying AFM 36-1, and they appeared to make their choices only after a great deal of thought.

The specialties the cadets selected are not the focus of this analysis. Instead, attention is given to the statements they made in discussing their interest in the specialties they selected. Here they showed at least some of the factors they considered important in planning their Air Force careers. Presumably, the factors they mentioned were those that loomed largest in their thoughts, the most important of the considerations they actually used.

Sixty-nine pertinent remarks were counted in the cadets' papers. Two of the remarks concerned the importance of fringe benefits such as flight pay; two indicated interest in an active role in operational units of the Air Force; the rest fell into two major groups focused on training, education, and experience: the majority of the remarks cen-

tered on desire to apply already-acquired education and experience to real-life tasks; the remainder centered on desire to receive additional education, training, and experience that would be of value at some more or less distant point in the man's lifetime.

Some illustrative comments are quoted verbatim from the cadets' explanations of their interest in Air Force specialties:

To apply acquired knowledge

"I would like to make as much use as possible of the specialized knowledge gained in my research. . . ."

"My working in the area of human vision would probably be of value to the Air Force, where vision is so important in flying, and at the same time would allow me to make optimum use of my specialized knowledge."

"I have a . . . degree . . . which will qualify me for management development work . . . plus I have 18 months of industrial experience that would qualify me for dealing with civilian contractors."

"I do not want to be like the man in the biblical parable, who, when given a talent by his master, buried it and never made use of it. I have worked hard to learn the basics of the . . . trade; I thought carefully before deciding that it was in this field that I could best contribute to my world; therefore I feel that it is in this area that both the Air Force and I can benefit."

"I will be very disappointed if I cannot get a job in or related to geology because this is where I feel I could make a real contribution to the Air Force."

". . . have done much practical computer troubleshooting and repair. As a result, I have a feel for the problems associated with maintaining a computer system, and planning for the installation of equipment."

To acquire new knowledge

"An . . . assignment requiring research in and/or practical use of knowledge in these fields would both sustain my interest and motivation and play a constructive role in my long-term educational development."

"I have an interest in learning to manage and administrate as well as a general interest in the personnel field. . . ."

"The broad area of public media seems challenging, the chances for reporting, writing and editing appear abundant, the familiarization with radio-television would be beneficial."

"I think this would prove to be an interesting job and one that could provide valuable experience."

"It would provide much managerial experience which would be invaluable in any career in or out of the Air Force."

"This field has interested me for some time because it promises to be a new learning experience, a challenge. . . ."

The 24 cadets at Stanford are a minute percentage of the roughly 4500 men that AFROTC commissions each year. Their attitudes may not be typical of the majority. But the indication that these cadets placed most emphasis on using education or gaining education in their jobs may be of benefit to supervisors or other Air Force personnel charged with helping junior officers develop Air Force careers. In particular, it sounds a note of caution with respect to one career-planning philosophy that has recently been observed: the focus on promotion.

The Stanford study indicates that officers, at least at the very beginning of their careers, put more emphasis on the use of knowledge or on the acquisition of knowledge than they do on "advancement opportunities." Opportunity for promotion in "rank" or in "responsibility" is rated fairly important by people in some civilian jobs,[3] but it was mentioned only once in the Stanford cadets' papers. The reason may be that the military promotion system is more clearly visible and understandable than civilian promotion systems. Air Force promotions in rank are clearly linked very closely to seniority, and promotions in job responsibility are closely linked to promotions in rank. The Air Force has formal programs for developing executive abilities in junior officers, with delineated patterns that officer assignments are to follow, including phase points for education, training, and types of duty.[4] Therefore, junior officers are "assured" of promotion in both rank and responsibility if they prove competent on the job. This frees them to "ignore" promotion concerns and to shape their careers around other con-

siderations—for example, use or acquisition of knowledge.

Nevertheless, some effort to get junior officers to plan their careers around considerations of promotion is evident. During the summer of 1968, about 300 lieutenants and captains received these instructions:

> Write . . . at least 500 words describing your limited career goal and what two assignments you want after you complete your present assignment. These two assignments should logically lead to a third assignment which is your limited career goal. State your goal as a duty title and AFSC [Air Force Specialty Code] that you can logically achieve. Do not consider further schooling as assignments but as steps to qualify you for your two assignments and your goal . . . . Your letter will aid in monitoring your career under "Project Air Force Career."

Project Air Force Career is broader than this question of promotion goals versus experience goals. But the direction it takes on this question may have significant impact on Air Force retention of junior officers. While there appears to be no harm in allowing junior officers the *option* of planning the job promotion pattern they would like to follow, perhaps more emphasis should be placed on opportunities for selecting a variety of specialties.

It would appear appropriate to extend the assignment selection procedures now used for AFROTC cadets to officers on active duty. For example, every five years an officer could be required to reassess his role in the Air Force and to identify three specialties in different career areas for which he is qualified to some degree. He would be asked to state precisely his qualifications and to rank the specialties in the order he prefers them, best liked to least liked. This information, then, would be the focus of the individual officer's planning of his Air Force career.

Both the Air Force and the man would benefit from this emphasis in several ways. First, it is not always desirable for an officer to "specialize" in one field for too long a time. This can lead to stagnation. Most officers, of course, have opportunity to volunteer out of their current field and enter another. But inertia tends to work against this. There is a natural tendency for men to remain in the field they have grown accustomed to. The requirement to consider, list, and justify three specialties at intervals would work to break this inertia and, presumably, lead to a broadening of many officers' careers.

Second, the Air Force sometimes cannot afford to allow men to remain in a certain career field. Pressing Air Force requirements can force the assignment of men to new fields. Sometimes such assignments appear to be made on a "buckshot" basis—assignment with little regard for a man's experience, interests, or preferences. Then the men who feel malassigned have grounds for rationalizing their poor work performance. Given every officer's preferences as to the three specialties he most desires, the Air Force probably would have a better chance of making the "buckshot" assignments coincide with the right men who have the right interests.

FROM the Stanford study, it appears that considerations of the use or acquisition of education and experience are of highest importance to the man involved. Therefore, career planning based on these considerations, as expressed through the three-specialties program when expanded Air Force-wide, should tend to increase officers' satisfaction with their assignments and with the Air Force. Altogether, the ultimate result should be to enhance retention of career officers.

Stanford University

Notes:

1. Eugene J. Webb, Donald T. Campbell, Richard D. Schwartz, Lee Sechrest, *Unobtrusive Measures: Nonreactive Research in the Social Sciences* (Chicago: Rand McNally & Co., 1966).
2. AFROTCM 45-1, Chapter 8.
3. *Career Satisfactions of Professional Engineers in Industry* (Washington, D.C.: Professional Engineers Conference Board for Industry, Inc., n.d.), pp. 10, 39.
4. "FOCUS [Formal Officer Career Utilization Structure]—On Officer Career Planning," *Air Force and Space Digest*, June 1968, p. 133.

Books and Ideas

THE ORIGINS OF THE SECOND WORLD WAR

Reflections on Three Approaches to the Problem

DR. DONALD S. DETWILER

FEW serious historians categorically deny that Adolf Hitler was responsible for having unleashed the Second World War. There is less agreement, however, on the precise definition of his responsibility, the extent to which it must be shared with others, and the means by which it may be demonstrated. The purpose of this article is to review three approaches to the problem of defining the origins of the war: the textual criticism of Hans-Günther Seraphim,† the academic exercise of A.J.P. Taylor,†† and the grotesque misconstruction of David L. Hoggan.†††

THE Göttingen archivist and historian Hans-Günther Seraphim is by no

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†Hans-Günther Seraphim, "Nachkriegsprozesse und zeitgeschichtliche Forschung," *Mensch und Staat in Recht und Geschichte: Festschrift für Herbert Kraus*, ed. Hans Kruse and Hans-Günther Seraphim (Kitzingen/Main: Holzner-Verlag, 1954), pp. 436-55.

††A.J.P. Taylor, *The Origins of the Second World War*, Premier paperback t193, 2d ed. (Greenwich and New York: Fawcett Publications, Inc., 1966).

†††David L. Hoggan, *Der Erzwungene Krieg: Die Ursachen und Urheber des Zweiten Weltkriegs* (Tübingen: Verlag der Deutschen Hochschullehrer-Zeitung, 1961).

means a revisionist in the sense that Taylor is, to say nothing of Hoggan. He neither explicitly questions that Hitler started the war nor suggests that there is any question in his mind about Hitler's primary responsibility for the outbreak of war in 1939. However, in his contribution to a collection of essays published in honor of the Göttingen law professor, Dr. Herbert Kraus, he does deny the historiographical legitimacy of the Nuremberg verdict. He raises serious methodological questions concerning the validity as historical sources of several documents which were cited in the verdict of that International Military Tribunal as particularly conclusive proof of Hitler's deliberate intention to start the war. Most important are the records of Hitler's secret conferences on November 5, 1937, May 23, 1939, and on August 22 and November 23 of the same year.[1]

Hitler had, of course, indicated his aggressive intentions in *Mein Kampf*, in his party newspaper *Völkischer Beobachter*, and in public speeches long before coming to power. But in studying the origins of the war, we cannot attach the same significance to those earlier utterances as we can to what Hitler said as *Führer und Reichskanzler* to his closest associates during the period immediately preceding the conflict. Do we, however, actually know exactly what Hitler did say, especially at these crucial conferences? Are the records that have been preserved dependable enough to be considered reliable sources by the responsible historian? These are the questions Seraphim raises. Let us review his argument concerning the three most important of the conferences cited in the Nuremberg Judgment, those which took place before the actual outbreak of the war on September 1, 1939.

1. On November 5, 1937, Hitler summoned to the New Chancellery in Berlin his ministers of war and foreign affairs as well as the commanders-in-chief of the German army, navy, and air force. He discussed the need to increase Germany's *Lebensraum* and the various means by which he intended to do it. He spoke bluntly of war and of the urgency of preparing for it. The record of this conference has been called a summary of German foreign policy in 1937 and 1938. Yet the fact is that at the time no official record was made. It was only five days later that, on his own initiative, Hitler's *Wehrmacht* adjutant, Colonel Friedrich Hossbach, finally prepared a memorandum on Hitler's speech, filling in from memory the gaps in the notes he had taken. Although this minute has often been described as the "Hossbach Protocol," its author would not have been able to prepare a complete transcript of the proceedings. "Since I do not have stenographic ability," he later testified, "I was not in a position to give a literal or complete account of the meeting (*Da ich über keine stenographischen Fähigkeiten verfüge, war ich zu einer wortgetreuen und vollinhaltlichen Wiedergabe der Sitzung nicht in der Lage*)."

Considering the fact that Hitler had gone so far in his introductory remarks as to call this speech his political testament, Hossbach, well aware of the deficiencies of his memorandum, attempted repeatedly to have Hitler review and correct it. To his surprise, however, Hitler would not so much as look at it. Consequently, even if we had the original of Hossbach's uncorrected version, we could by no means regard it as completely accurate or dependable. Yet we do not even have that. The original of the Hossbach minute was never found after the war. Document PS-386, which was used at Nuremberg, is a typed copy. When Hossbach was shown a photocopy of this document and called upon to certify its authenticity, he declined to do so, merely declaring that what he was shown was a correct photocopy of PS-386. (This occurred when he was asked to sign an affidavit stating that PS-386 was a correct transcript of the original manuscript. He did sign the affidavit, but only after inserting the words "photocopy of," as Seraphim saw in the original copy. Thus the word "correct" was made to refer to "photocopy" rather than "transcript," so that his statement merely affirmed that the photocopy was a correct copy of the transcript, not that the transcript was a correct copy of the orig-

inal manuscript. That, he explained, would have been an affirmation which, after so many years, he could make in good conscience only on the basis of comparison with the original.)

We cannot be sure, therefore, that we have an accurate version of Hossbach's minute, the inadequacy and possible inaccuracies of which had already concerned him when he originally got around to writing it almost a week after the conference. Seraphim concludes that the Hossbach memorandum can only be used with great care by the conscientious historian.

2. The second of the key documents questioned by Seraphim is the record of a conference of Hitler with his generals on May 23, 1939. It was prepared by Hossbach's successor, Lieutenant Colonel Rudolf Schmundt. This meeting, at which Hitler explained to his military leaders the goals of his policy, was held after the march on Prague and dismemberment of Czechoslovakia, the annexation of Memel, and the repudiation of the naval agreement with London and the nonaggression pact with Warsaw. Goebbels's press campaign against Poland was becoming more and more intense, focusing on Danzig and the Polish Corridor. But Hitler is recorded as having assured his generals that Danzig was not the basic issue. What he was really interested in was acquisition of territory in the East and what he called the "solution of the Baltic problem." In other words, this document, like the previous one, is unambiguous evidence of Hitler's aggressive intentions. But like the Hossbach memorandum, it also has serious technical deficiencies. In the first place, there is no indication as to when the minute was actually written. In this case, moreover, there was no possibility of consulting the writer, since Schmundt was killed by the bomb that Count Stauffenberg planted in Hitler's headquarters on July 20, 1944.

Primarily on the basis of internal evidence, Seraphim develops a not implausible case to demonstrate that Schmundt's minute was almost certainly written so long after the conference that it cannot be considered a

valid primary source. The first indication of this is the inclusion of Göring and Warlimont among the list of participants. At Nuremberg, General Warlimont, who in May 1939 had been a colonel with an assignment that would have made his presence most unlikely, emphatically denied having been at the conference, and none of those who were there remembered his having attended. Göring, on the other hand, was unsure whether he had attended or not, though inclined to believe he had. However, his state secretary in the air ministry, Erhard Milch, who was listed and was present, who claimed that he had been sent to the conference to represent Göring, and who otherwise

would hardly have had reason to be there, asserted unequivocally that Göring was not there. Seraphim attributes the discrepancy in regard to Warlimont and the very possible discrepancy as to Göring to the minute having been written so much later that Schmundt no longer could remember who had attended. He finds a number of other points to support this hypothesis, which, he observes, has also been developed in a separate study by Field Marshal Milch. Perhaps the most impressive argument is that Schmundt attributes to Hitler a number of observations and assertions which Hitler would not have been apt to make in May 1939 because they actually relate to subsequent situations and events. Thus Hitler is reported to have referred to the possibility of the Italians breaking through the Maginot Line. Yet this conference occurred over three months before the attack on Poland and almost a year before the western offensive against France. The thought of using Italian forces against the Maginot Line did not come up until early in 1940 (and then only briefly). Its mention by Schmundt therefore suggests that the minute may not have been written before January of that year, eight months after the conference. This hypothesis is further supported by the fact that Hitler is made to speak repeatedly of the necessity for security in terms which he used only after the grave security breach resulting from a German courier plane, with war plans, landing in Belgium in January 1940. Former army chief of staff Franz Halder in a letter to Seraphim categorically stated that Hitler did not so much as touch on the matter of security on May 23, 1939. Finally, to cite but one further detail among a number, on page seven of Schmundt's manuscript the heading "How does this conflict with England look *(Wie sieht diese Auseinandersetzung mit England aus)*?" was altered, in Seraphim's judgment by Schmundt's own hand, to read, "How will this conflict look (*Wie wird diese Auseinandersetzung aussehen)*?" The point is, of course, that the original phrasing had reflected all too clearly the attitude of a nation already at war with England.

Seraphim's conclusion from these and a number of other indices is that the Schmundt minute was written so much later that for the purposes of historical research it cannot be considered a valid primary source *("dass es für die historische Forschung als historische Quelle ausscheiden muss")*.

3. On August 22, 1939, on the eve of Ribbentrop's flight to Moscow to sign the Nazi-Soviet Pact and little more than a week before the invasion of Poland, Hitler summoned to Obersalzburg the senior admirals and generals of the German armed forces for an all-day briefing on the political situation and his military plans. The record of this conference used at Nuremberg, documents PS-798 and PS-1014 for the morning and afternoon sessions, respectively, bears no heading, date, signature, or other evidence of provenience whatsoever. Seraphim notes that, having been written in the first person, it might conceivably have been the outline from which Hitler spoke, but he rejects this possibility because it is not typed in the extra-large script that Hitler required in order to be able to read without his detested spectacles. Another minute of the conference of August 22, 1939, was drawn up the evening of the same day by Admiral Böhm. It differs in a number of important points from that accepted by the Nuremberg Tribunal as the authoritative version. In an affidavit presented to the court by Admiral Raeder's defense, Admiral Böhm categorized the anonymous version as imprecise and superficial *("ungenau und oberflächlich")*. He went on to cite specific statements which he alleged had falsely been attributed to Hitler. Nor is this the only quarter from which PS-798 and 1014 have been challenged. Seraphim cites the testimony of Admiral Schülte-Monting, of Field Marshals von Leeb and von Küchler, and of General Halder to further discredit the accuracy of the protocol, which he consequently rejects as too problematical to be considered a dependable source. The fact, which Seraphim presumably did not know when writing his essay, that the account of the conference in Halder's diary is in some respects closer to

that of PS-798 and 1014 than that of Böhm, may weaken the case but by no means destroys it, for Seraphim is not pleading the authenticity of Böhm's version rather than the accepted one. He is arguing, rather, that in view of the authoritative testimony of persons present August 22, 1939, at the conference, the accuracy of the anonymous minute is so questionable that it cannot be relied upon by the historian. As in the case of the other two minutes, this document, just as any, even if accepted as evidence and published by an international military tribunal or any other agency, must be judged according to the criteria of sound historiography, and provenience is certainly a criterion of primary importance.

IF THE German historian Hans-Günther Seraphim did not undertake in his 1954 essay to do more than chip away at the massive documentary foundations on which rested the verdict of Nuremberg, the British historian and once bitter critic of German power politics A. J. P. Taylor undertook in 1961 a surprising frontal assault with a full-length study entitled *The Origins of the Second World War.*[2]

The International Military Tribunal had, in effect, placed the full burden of guilt for the war on Hitler Germany. During the intervening years, this very one-sided interpretation of the origins of the war in Europe had gradually given way to a more pluralistic approach. World public opinion and historiography generously permitted the Germans to share their guilt with others. Western historians gave Stalin full credit for his complicity in Hitler's aggression on Poland, while Communists, not to mention American revisionists like Charles Callan Tansill, sought and found Hitler's witting or witless coconspirators against world peace among the leaders of the Western democracies. But Taylor's book, so strikingly different in tone and content from his earlier works on modern German history, attempts to make a radically fresh start:

> Many ... believe that Hitler was a modern Attila, loving destruction for its own sake and therefore bent on war without thought of policy. There is no arguing with such dogmas. Hitler was an extraordinary

> man; and they may well be true. But his policy is capable of rational explanation; and it is on these that history is built. The escape into irrationality is no doubt easier. The blame for war can be put on Hitler's Nihilism instead of on the faults and failures of European statesmen — faults and failures which their public shared. Human blunders, however, usually do more to shape history than human wickedness. At any rate, this is a rival dogma which is worth developing, if only as an academic exercise. (p. 209)

Some of Taylor's readers have been annoyed by this passage and its implications. They suspect him of hedging, of refusing to commit himself unequivocally to the thesis of his book. Moreover, he puts his critics in a somewhat uncomfortable position by his ambivalence. Those who would roundly condemn him for his revision cannot be sure he means it seriously, cannot be sure it is more than "an academic exercise," while those who would laud him for the latter cannot be sure that he has not thrown them off the scent by a cunning verbal gambit. But the problem of his intention, intriguing though it may be, is not my concern here. Whatever Taylor may have set out to do, his book's primary value, in my opinion, lies in the re-examination and rethinking of the origins of the Second World War which it has stimulated.

Assuming the pose of an academic Rip Van Winkle who had slept not through the American Revolution but through the decade between Hitler's march into the Rhineland and Eisenhower's and who never had heard of the terror of V-bombs or the horror of Dachau, Taylor went back to the archives to work his way through the documents leading up to the Second World War and write an objective account of its origins. With a faith (whether genuine or feigned is beside the point) in traditional values and virtues worthy of a simpler and happier age, he wrote as though each of the protagonists was essentially an honorable man, capable perhaps of stupidity but not of malice nor, least of all, of the demonic fanaticism of the German dictator.

Asking himself not "What is the truth?" but "What is a rational and plausible explanation?" he rises to the occasion when he finds none by inventing it. Thus we read that at the conference of November 5, 1937, Hitler was conspiring not against the peace but merely against his own Minister of Economics, Hjalmar Schacht, whose frugality threatened the armaments program. Furthermore, Taylor informs us, the extensive changing of the guard at the beginning of 1938, which saw the removal of Blomberg, Fritsch, Neurath, Papen, and Hassell, was a smoke screen to cover the financier's break with the Hitler regime. "...The resignation of Schacht," he writes, "could now be smuggled quietly in among the other changes. This was of course the object of the whole operation; yet in the stir of the time it passed almost unnoticed." (p. 138)

This is, to say the least, a novel interpretation. Yet there may, in fact, be a grain of truth in it. Do we know that there is not? Can we afford to dismiss the possibility that this consideration might not *also* have played a part, even though a very subordinate one indeed, in the events of fall and winter 1937-38? Are those who reject Taylor's interpretation, unexamined, prepared to assert that in the labyrinthine maze of the inscrutable Austro-German tyrant's subconscious such secondary considerations may not in fact actually have tipped the scales in favor of one course instead of another? Percy Ernst Schramm has analyzed Hitler's personality and military leadership in two extensive essays published as introductions to the war diary of the German high command and to a new critical edition of Hitler's table conversations.[3] He found that Hitler lived simultaneously on several levels of consciousness, often failing to differentiate between dream and reality, and acknowledging, at least on one occasion, his failure to resolve irreconcilable contradictions in strategic plans as "problems of the future which I do not think through *(Probleme der Zukunft, die ich nicht zu Ende denke)*."[4]

Confronted with a mind like this, can we categorically dismiss Taylor's alternative

explanations and analyses as nothing more than exegetical casuistry? Taylor's account may indeed be two- instead of three- or four-dimensional. In its way, it may be as two-dimensional, in fact, as the Nuremberg verdict. But in dealing with the extraordinarily complex problem of the origins of the Second World War, we cannot afford to ignore Taylor's contribution.

Deliberately studying his subject through colored lenses that filter out the dominant pattern of Hitler's aggressive intentions, Taylor has enabled himself to see far more clearly than ever before other threads in the fabric of events that led to war; he has, so to speak, "taylored" his history to make them apparent to us as well. There are few, I trust, who will be convinced by his basic thesis that Hitler was a rational statesman forced by circumstances more or less beyond his control into a war he did not want. But by the same token, I think that few who carefully and critically read this book (and I would not recommend it to someone unprepared to read it critically) will fail to be stimulated into rethinking many of the episodes and aspects of the chain of events which led to catastrophe. Whatever Taylor's purpose in writing may have been, I think that, on the whole, the book will ultimately serve the cause of historical truth far better than its individual pages do.

DAVID L. HOGGAN'S account of the origins of the Second World War, with its suggestive title *When Peaceful Revision Failed,* may never appear in the original English version. However, a German translation appeared late in 1961 in Tübingen and received very favorable notices in the neo-Nazi and ultra-conservative press.[5] Hoggan, seizing upon formal flaws such as Seraphim pointed out in the minutes of Hitler's conferences of November 5, 1937, and May 23 and August 22, 1939, either entirely dismisses these sources and all they represent or else distorts them to suit his conception of history. Like Taylor, Hoggan casts Hitler as a conscientious statesman in the Continental

tradition—certainly cunning, and perhaps even somewhat Machiavellian at times, but basically honest and sincere. However, he does not stop there, for his 900-page tome is neither an exercise in textual criticism nor a more extensive attempt than Taylor's to demonstrate that the Second World War can be accounted for in terms of rational motives and conventional blunders without recourse to conspiratorial or demonic explanations. Quite the contrary! Hoggan has his villains. With all the partisan vehemence of a Charles C. Tansill, whose *Back Door to War* he characterizes as a brilliant analysis, or a Harry Emerson Barnes, who defended him in the vitriolic exchanges printed in the columns of the *American Historical Review*,[6] Hoggan exposes the cynical ruthlessness with which England, having failed to destroy Germany during the First World War, set out to finish the job in the Second. The primary responsibility for the outbreak of the war, according to Hoggan, rests not with Hitler but with Lord Halifax, the British foreign minister:

> In London [writes Hoggan], Halifax succeeded in forcing on the British Government a deliberate policy of war despite the fact that most of the prominent British ex-

perts on Germany argued for a policy of German-English friendship. In Warsaw, [Polish Foreign Minister] Beck was prepared to collaborate fully with Halifax's war plans despite the warnings from numerous Poles who were horrified by the prospect of seeing their land destroyed.

German, Italian, French, and other European leaders did all they could to avert the great catastrophe, but in vain, while Halifax's war policy, accompanied by the secret blessings of Roosevelt and Stalin, carried the day. . . .

The Second World War arose from the attempt to destroy Germany. (p. 793, my translation—D.S.D.)

If Taylor's conclusions were false, Hoggan's are not only false but also vicious. Taylor seeks the origins of the war less in the malice or megalomania of Hitler than in the human faults and failings of European statesmen of good faith. Taylor may not bring Hitler to justice, but at least he is hardly a character assassin. Hoggan, however, defames as ruthless aggressors or cynical accomplices statesmen whose judgment Taylor indeed questions but whose character at least he does not malign.

HANS-GÜNTHER SERAPHIM, by his almost agonizingly meticulous textual criticism, challenges us to re-examine our comfortable documentation. He challenges us to leave our neat shelves of source books published in translation and go back to the archives and study the original documents themselves —typescripts, manuscripts, or whatever they may be, taking into consideration not only bare verbal content but also marginalia, emendations, provenience, and context. Otherwise we cannot have sound documentation; and without sound documentation we cannot have the sound historical writing we need in order to understand the past.

A. J. P. Taylor, in his academic exercise, goes further. In a sort of laboratory demonstration, he also challenges our documentation, but only in passing. His primary concern is our objectivity (and perhaps also his own) regarding the question of the origins of the Second World War. Knowing that we have the ultimate answer, the guilt of Adolf Hitler, we may indeed have shirked our responsibility to study the secondary and corollary answers. Perhaps we have failed even to ask the questions that will lead us to discover other answers at all, though such questions may not be less valid or urgent than those to which we do have ready answers. We may indeed tend to take what Taylor terms the easier escape into irrationality—although when approached as a problem rather than as a solution, the irrational forces which contributed so much to the rise of National Socialism are a promising, though by no means easy, field of study, as has been shown by Christian Graf von Krockow, Georg Lukács, and Helmuth Plessner, to name but three.[7] We may not accept Taylor's thesis, and we may disagree with many of his implicit criticisms. That much he has to say is sound, however, will be clear to anyone who, rather than rejecting his book as a whole, sets out to refute it paragraph by paragraph. In another context, he himself once observed, "Error can often be fertile, but perfection is always sterile."[8]

While Seraphim and Taylor can be interpreted as offering essentially constructive criticism, David L. Hoggan cannot.[9] With his grimly serious, grotesque misconstruction, he can serve us only as an involuntarily eloquent warning never to lose our moorings and drift into the sea of prejudice and propaganda. For once we do, we risk destroying our intellectual integrity altogether, no matter what our field of endeavor.

Carbondale, Illinois

Notes

1. "The Nuremberg Judgment" as excerpted in *The Outbreak of the Second World War—Design or Blunder?* ed. John L. Snell, "Problems in European Civilization" (Boston: D. C. Heath and Co., 1962), p. 3. This 125-page paperback gives a convenient cross section of the discussion during the fifteen years from the Nuremberg trials to its publication in the form of an excellent introduction, extensive excerpts from widely differing authorities, and a concise bibliography.

2. Two previous books on Germany by Taylor, who is one of the most readable historians of our time, are his incisive portrait of the Iron Chancellor, *Bismarck: The Man and the Statesman*, Vintage paperback V-387 (New York: Random House, 1955); and *The Course of German History*, Capricorn Giant paperback 218 (New York: Capricorn Books, Inc., 1962), an extremely hostile interpretation written during the Second World War.

3. Percy Ernst Schramm, *Kriegstagebuch des Oberkommandos der Wehrmacht (Wehrmachtführungsstab), 1940–1945*, Vol. IV (Frankfurt/Main: Bernard & Graefe Verlag für Wehrwesen, 1961), pp. 37–74; Henry Picker, *Hitlers Tischgespräche im Führerhauptquartier 1941–1942*, ed. Percy Ernst Schramm (Stuttgart: Seewald Verlag, 1963), pp. 28–119. These introductory essays will soon be published by Quadrangle Books, Inc., Chicago, in English translation with an introduction by the author of this article. The volume is tentatively entitled *Adolf Hitler: The Man and the Military Leader*.

4. Schramm, *Kriegstagebuch*, Vol. IV, p. 55, footnote 1.

5. The sophisticated liberal German newsweekly *Der Spiegel*, Vol. 18, No. 20 (May 13, 1964), had a cover story on Hoggan, his book, and its reception in Germany, as well as a most revealing interview in which he developed and attempted to defend his thesis. He fared as poorly as his book has in serious reviews. But it has certainly found a clientele. By 1964 it was already in its fifth edition (which was used in writing this article).

6. Hoggan's book was initially reviewed in the October 1962 number of the *American Historical Review* (the same number in which the fourth volume of the *Kriegstagebuch*, cited above in note 3, was reviewed). For Hoggan's and Barnes's first letters protesting the devastating (but fair) review, and the reply by the reviewer (Professor Gerhard Weinberg of the University of Michigan), see the April 1963 number. The second round, with additional contributions, is in the October 1963 number. (These three issues are included in Vols. 58 and 59 of the *American Historical Review*.)

7. Count Christian von Krockow (political science professor at Frankfurt), *Die Entscheidung: Eine Untersuchung über Ernst Jünger, Carl Schmitt, Martin Heidegger* (Stuttgart: Ferdinand Enke Verlag, 1958); Georg Lukács (the Hungarian Marxist whom Thomas Mann once called "the most important literary critic of today"), *Die Zerstörung der Vernunft: Der Weg des Irrationalismus von Schelling zu Hitler* (East Berlin: Aufbau-Verlag, 1955), reprinted in part in West Germany in a paperback edition, *Von Nietzsche zu Hitler oder Der Irrationalismus und die deutsche Politik* (Frankfurt and Hamburg: Fischer Bücherei, 1966); Helmuth Plessner (professor emeritus of sociology and philosophy at Göttingen), *Das Schicksal deutschen Geistes im Ausgang seiner bürgerlichen Epoche* (Zürich: Max Niehans Verlag, 1935), a challenging sociocultural analysis published almost immediately after the Nazi seizure of power, and reprinted over twenty years later with a new introductory essay as *Die verspätete Nation: Uber die politische Verfügbarkeit bürgerlichen Geistes* (Stuttgart: W. Kohlhammer Verlag, 1959).

8. Ved Mehta, *Fly and the Fly-Bottle: Encounters with British Intellectuals*, Pelican paperback A-723 (Baltimore: Penguin Books, Inc., 1965), p. 155.

9. Though Seraphim's essay has been easier to ignore than refute, Taylor's and Hoggan's far more vulnerable studies have both been very widely reviewed and discussed. Perhaps the most thorough analysis of both is the distinguished Swiss-German historian Walther Hofer's 50-page appendix to the fourth edition of his basic work on the unleashing of the Second World War, *Die Entfesselung des Zweiten Weltkriegs: Eine Studie über die internationalen Beziehungen im Sommer 1939 mit Dokumenten* (Frankfurt am Main: S. Fischer Verlag, 1964), pp. 419–75. While the references cited above in notes 5 and 6 are a good introduction to the discussion of Hoggan, the most impressive and damaging review of Taylor was undoubtedly his Oxford colleague H. R. Trevor-Roper's brilliant review article in *Encounter*, which is reprinted in the Snell book cited in note 1. Taylor answered his critics collectively in a chapter of "Second Thoughts" appended to a new edition of his *Origins* (pp. 277–93 of the edition cited on page 94). He also found a rhetorically adequate reply to Trevor-Roper in the form of an *Encounter* article of his own entitled "How To Quote—Exercises for Beginners." In two columns he juxtaposed a number of Trevor-Roper's statements about his book and original quotations from it, graphically demonstrating that enough liberties had in fact been taken to justify his final juxtaposition. In the column opposite the observation that the book "will do harm, perhaps irreparable harm, to Mr. Taylor's reputation as a serious historian," he placed the mordant observation that "the Regius Professor's methods of quotation might also do harm to his reputation as a serious historian, if he had one" (quoted from Ved Mehta, *Fly and the Fly-Bottle*, p. 102, who covered the controversy in the chapter "Argument Without End" of his stimulating book, which originally appeared as a series of articles in the *New Yorker*).

MR. FINLETTER IN THE INTERIM

BRIGADIER GENERAL NOEL F. PARRISH, USAF (Ret)

THOMAS K. FINLETTER is a man of incisive intelligence who has held positions of broad responsibility in our government. He replaced Stuart Symington as Secretary of the Air Force in 1950 and held that post through the critical first two years of the Korean War. He was United States Ambassador to the North Atlantic Treaty Organization from 1961 to 1965.

Despite his apparent qualifications as

an analyst of foreign policy, Mr. Finletter has written an inconsequential book.† This is disappointing, especially since his *Power and Policy* (1954) was an informative contribution to strategic thinking at the close of the Korean War.

Interim Report is a discussion of certain military and diplomatic contacts between the United States and its Eurasian allies over the past twenty-five years. The book recounts a few successes and a few failures in our relationships with nations of the Atlantic Alliance. It decries our failures and even our hopes in South Vietnam. Through all of this Mr. Finletter stoutly maintains that if the United States had worked closely with the North Atlantic Treaty Organization at all times it would have found much better solutions to military and diplomatic problems around the globe.

For Mr. Finletter and other advocates of one "grand alliance," the first and most important line of defense for Western civilization corresponds roughly to the eastern boundaries of the ancient Roman Empire. America's first duty to humanity and to itself is to defend along that line. Our justly beloved relatives, or most of them, are west of the line, and they possess the military and economic potential we need to supplement our own.

To support this historic doctrine Mr. Finletter points out that the American military and economic commitment to Western Europe has caused peace to prevail there since World War II. Unfortunately, peace has been prevalent almost nowhere else. Mr. Finletter stretches his thesis almost to the point of absurdity by arguing that our present troubles in Asia derive from too little attention paid to Europe rather than too much.

It is a time-honored custom for those who complain of a bad situation to blame it on "the War." Mr. Finletter is not content with so routine a performance. He manages to fix blame for the Vietnam War, in turn, upon the basic complaint of his book: our failure to engage in more extensive political consultations with allies in Europe.

The complaint is pushed hard. General de Gaulle may be famous as a saboteur of NATO, but Mr. Finletter looks upon him as a victim of our neglect of NATO. American "policy makers," he declares, have rejected the General's proposal that South Vietnam be neutralized on the basis of the old Geneva accords. That Hanoi has rejected this old "multilateral guarantee" is not mentioned.

General de Gaulle is one military man whom Mr. Finletter admires. A "triumphant trip to Moscow" is his term for General de Gaulle's ceremonial reception by Russian leaders, which actually proved to be of no consequence. Another General, Eisenhower, is criticized by Mr. Finletter for rejecting De Gaulle's suggestion that France, America, and Britain join in a three-handed effort to settle world problems on behalf of NATO.

Going still further back, Mr. Finletter sees French-British defiance of NATO in attacking Suez as partially caused by the U.S. He says: "The American go-it-alone operation in Vietnam, which by the time of Suez was well under way, must have had much to do with the British and French attitude."

Neither the British nor the French tried to use this weak alibi. In 1956 the French had not entirely abandoned their interests in southern Indochina, and the few Americans in South Vietnam had certainly not gone very far.

Strange as it may seem, the U.S. is accused by Mr. Finletter of "refusing to allow the French or the British to take any part in its sponsorship of the Diem government." That the French had their own more dubious candidate for government and that the British did not wish to become involved in the effort to save South Vietnam are overlooked. Equally startling is Mr. Finletter's accusation that the French tried to persuade the U.S. "to bring pressure on Diem to build a broad popular base for his government" and that the U.S. refused to do this! Of course the French, even after Dien Bien Phu, felt they knew what was best for Vietnam, but Mr. Finletter's recital of

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†**Thomas K. Finletter, *Interim Report on the U.S. Search for a Substitute for Isolation* (New York: W.W. Norton & Co., Inc., 1968, $4.95), 187 pp.**

their aims there seems to have gained something in translation.

Many critics of the Vietnam War, including Mr. Finletter, charge that it is "American-dominated." They often state or imply, as he does, that the Korean War was different in this respect. It is true that a formal U.N. sanction was obtained, but the American sacrifice of men and materiel in Korea was predominant. For good or ill, American military and diplomatic policies prevailed despite frequent disagreements with allies rendering token assistance. In much the same manner the Vietnam War has become increasingly "American-dominated" as other nations have failed to share its burdens. Yet Mr. Finletter says Britain and Pakistan refused to fight in the Vietnam War because it was American-dominated. Surely this statement represents a considerable reversal of cause and effect.

Another oversight may be suspected in Mr. Finletter's statement: "Until the very end in 1964 and 1965...our government leaders were convinced that...the South Vietnamese could defend themselves alone...without combat aid." Which government leaders? The end of 1964 and the beginning of 1965 coincided with an election and an inauguration in the United States. Though he chides General Maxwell Taylor and Secretary of Defense Robert McNamara for previous predictions that were wildly optimistic, Mr. Finletter fails to concede the political usefulness of rosy predictions. Anyone acquainted with American leaders who were actually in Vietnam at the time knows well enough that their views were not reflected in the pleasing pre-election statements of the diplomat General and the political Secretary.

Mr. Finletter is right when he observes that the Vietnam War caused a new emphasis on the Far East and away from Europe. The "*sale guerre*," as he calls it, has been blamed for everything from the price of tomatoes to the shortage of marihuana. Its contribution to the decline of NATO is undeniable. Yet other causes of the eclipse of Europe existed before the Vietnam War and will remain after it is over.

In this reviewer's opinion, the rise of Russian nuclear strength relative to our own, which was in some degree inevitable, has been a fundamental cause in the weakening of our world position and of our alliances. In 1948, our nuclear stockpile began a rapid expansion. Until the Russian stockpile and delivery system began such an expansion some years later it appeared inconceivable that the Kremlin would risk a premature challenge to our preponderant nuclear strength. As Russian nuclear strength approaches ours, the danger that the Kremlin might try a conventional challenge appears to increase. There is understandable fear among our allies that we might hesitate to provide a nuclear response to an overwhelming conventional attack against them. Beyond this fear is the almost unspeakable nightmare that some Russian leader may one day come to believe so firmly in the dominance of his own nuclear system as to risk a nuclear gesture or a crippling attack against us or against a more exposed ally while demanding "concessions." As our security becomes more and more "relative," faith in the collective security of an alliance also is weakened.

Mr. Finletter's past writings have dealt extensively with the problem of our necessary reliance upon nuclear weaponry for the protection of distant frontiers. *Interim Report* mentions it only in passing. It repeats a point Mr. Finletter often made as a crusading Air Force Secretary when, against the opposition of the Air Staff, he established the advance nuclear base at Thule and tried to bring in from SAC at Omaha a much younger General LeMay as his Chief of Staff. The point, as he briefly repeats it, is that the defense of Europe has depended "most importantly [on] the long-range nuclear weapons of the American Strategic Atomic Air of the U.S. Air Force and the complementary atomic weapons of the U.S. Navy."

Another important statement in *Interim Report* is less than informative. It concerns the strength provided by NATO's "thick line of khaki . . . along the dividing line"—an alleged strong and thick line of forces on the ground. There is no such thick line of defensive forces and no strong line of forces on the

ground. Only a scattering of national units in assorted sizes and strengths is in existence. These forces have no common system of supply, they are not linked together to form a battle line, and if they were the line would be far too thin to resist a determined Red attack.

For twenty years now it has been the futile goal of American policy to push NATO governments toward a big expansion of their conventional forces. Such an expansion might, by some stretch of the imagination, enable these forces to stop a Red invasion without relying upon American nuclear intervention. The continuing failure of this dream was documented as late as January of this year when the British Minister of Defence, Dennis Healy, reminded the NATO Council that military plans "had to be based on what Europeans are prepared to pay." He admitted that "if the Russians made a surprise attack, the West would have to reply with nuclear weapons in a day or two." He asked for agreement on their tactical use.

The same request was advanced in NATO almost twenty years ago. The problem has never been squarely faced. A dangerous fiction of adequate conventional forces for European defense has been maintained; *Interim Report* does not discourage it.

Saying that Western Europe has been rendered "safe and secure from any Russian menace" does not make it so. Calling this area a "citadel of strength" does not make it defensible by any existing means other than American nuclear weapons. The recent swift movement of massive Russian forces into Czechoslovakia has served to emphasize this obvious fact.

To present the NATO area as a safe and solid base from which to settle the world's military and diplomatic problems is to claim too much. It is difficult now to argue that isolationism may be avoided through more dependence upon a Europe that is becoming isolationist even more rapidly than the United States. Overlooked in *Interim Report* is the sad fact that our association with recently colonialist NATO nations has often embarrassed us with the new nations of Africa and Asia.

Mr. Finletter must be faulted for expanding upon the advantages of a closer connection with NATO while neglecting to examine the disadvantages. Yet his basic premise need not be challenged: the defense of Europe is indeed important to us. Our unswerving resolve to assist in that defense is essential for the maintenance of peace there. Any serious weakening of our military commitment to Europe, particularly our nuclear commitment, could upset not only the world's political and military equilibrium but also its economic equilibrium, through a loss of confidence in European investments.

In many respects Europe is a military liability. From a strategic standpoint it is too far from us and too close to Russia. Despite NATO, Europe still lacks military unity as well as political unity. It would be disastrous for us to be seduced at last by the wishful belief that Europe can be defended without nuclear weapons and most dangerous for us to give the Russians the impression that we would rely upon such a defense.

Yet Europe is a source of strength to us, morally, economically, and even militarily if we do not overestimate its military potential We cannot afford, for many reasons, to abandon Europe to Communist threats or actions, which means that we must plan and prepare a controlled and credible nuclear defense against any massive conventional invasion.

In his anxiety to establish closer diplomatic ties to Europe, Mr. Finletter goes so far as to state that "worldwide political consultation and unity are as necessary for the West as NATO's atomic shield is in Europe." This is comparing a forlorn hope with an established necessity. What would such consultation accomplish, and to what action might it lead? Would it lead, as Mr. Finletter hopes, to agreed NATO policies for areas adjacent to Communist China? What would result if the Atlantic community became a center "from which to coordinate worldwide the political and military policies of Europe and North America"?

According to Mr. Finletter, there should be no policing "of Communism in the extra-treaty areas" by any NATO nation or nations. Consultations within NATO on matters outside

NATO should be for one purpose only: to establish peaceful coexistence and "relations of nonwar" with the Communist powers. In other words, NATO must be defended militarily while the rest of the world is defended only diplomatically.

Working closely with our NATO allies on all foreign policy, Mr. Finletter believes, would help keep us "from doing anything foolish." This may be true, since outside Europe it would tend to keep us from doing anything at all. What evidence is there that our NATO allies are eager to involve themselves, even as consultants, in matters farther east? He cites NATO's Harmel Report of 1967 as evidence and calls the report "a big jump in the opposite direction of what has been happening in the Alliance since 1964." The key sentence of this opposite jump, quoted by Mr. Finletter with his italics, is this masterpiece of noninvolvement:

> *In accordance with established usage,* the Allies *or such of them as wish to do so* will also continue to consult on such problems without commitment and as the case may demand.

This sentence should be included in a "Timid Staff Officer's Manual" as an example of how to open more exits than entrances and how to make a nonquantum jump while keeping the feet flat on the floor.

It is an unhappy task to disagree on so many points with a man who has devoted as much time, energy, and ambition to the nation's service as Mr. Finletter has. But should that old albatross, the "multilateral force," be raised again without arousing a protest? Should former President Lyndon Johnson, who has absorbed enough blame, be denied credit for scuttling this imaginary mixed-crewed flotilla after four years of pressure for it had produced more resistance than support? The notion that an internationally assorted crew on a ship loaded with nuclear missiles would somehow provide international sanction for their use or nonuse remains fantastic.

It is to the credit of NATO military men that this spectral vision came first to nonmilitary academicians and researchers, at least four of whom have claimed or been granted credit for its authorship. Now that a few campuses have themselves become combat areas, we may expect an improved understanding of the most elementary principles of command.

Mr. Finletter defends the multilateral fleet as practical, and even acceptable, to a few NATO countries. He does not establish that it was fully endorsed by the honest seamen of any nation and he admits that the "timing" of the multilateral force, or "nuclear sharing" as he prefers to call the complex plan, was "unfortunate." He concludes that "it is not possible even now to give the explanation" for the abandonment of this project and that "historians will have to ferret out the facts which have not yet come to light." Fortunately Henry Kissinger, a historian of the past and present, analyzed the important facts three years ago in his book, *The Troubled Partnership.*°

Interim Report contains many statements that require no comment. Mr. Finletter warns that "political men" should change their ways so as to "attack—and destroy—the institution of war," and he observes that "peace really can be set up if the three great atomic powers agree." He chides someone—General LeMay, perhaps?—on Vietnam by saying: "The evidence seems to be clear that the notion that we could win the war by air power is not valid." And yet, despite his disapproval of our efforts and goals in Vietnam, he insists that "protection for the future safety and freedom of the people of South Vietnam will have to be included in the terms of peace." Has anyone asked for more?

Further, former Secretary of the Air Force Finletter has not abandoned his nuclear knowledge. He reminds us that "the United States Strategic Atomic Air is more than a match for the Russians and the Chinese combined, even looking ahead some years from now, provided of course that we keep alert and take no chances with our superiority in that all-important area." The wise and cautious proviso is disturbing.

Since our aim for nuclear superiority in the past produced little more than equality at present, what will be the consequence of our more recent aims for mere parity? Our hopes,

°**Editor's note:** Henry A. Kissinger's *The Troubled Partnership: A Reappraisal of the Atlantic Alliance* was reviewed by General Parrish in *Air University Review*, XVI, 6 (September-October 1965), pp. 83–89.

and the strength of our alliances, will rise or fall on answers to questions such as this rather than upon the frequency or the extent of any consultations.

Interim Report cannot be recommended for those with little knowledge of NATO, its history, and the complexity of its problems. Most especially it is not recommended for those with scant recollection of how and why we became awkwardly involved in Vietnam. The picture it presents is unbalanced and incomplete. However, *Interim Report* may be of cautious and critical interest to students of NATO and to veterans of NATO service because it was written by an important man who held an important post.

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ARABIA FELIX

DR. JOSEPH CHURBA

IT IS perhaps symptomatic of our times that while the true drama of Middle Eastern politics was unfolding in the mountains of obscure Yemen, paramount attention had focused on the Arab-Israeli zone as though events there held the exclusive key to the balance of power in the Middle East. At a time when the media of mass communication inundated the concerned American public with bombastic communiqués about relatively minor border skirmishes on the Arab-Israeli front, a cloud of silence concealed the continuous fighting in the Yemen that claimed 250,000 lives and rendered a million persons homeless. All the more startling was the studied indifference of the world community to the knowledge (never lost upon the Israelis) that for the first time since World War I poison gas (of Soviet origin) was reintroduced as a military weapon—and against civilians—by the ostensibly enlightened regime of Gamal Abdel Nasser. All the more conspicuous, too, was the deafening silence emanating from the very voices that condemned the American use of tear gas in Vietnam. Indeed, in the topsy-turvy land of Marxist dialectics that kind of logic is unassailable. Such, then, is the kingdom of politics.

If only because *Yemen: The Unknown War* represents the only work in its field, it provides indispensable reading for both diplomat and soldier.† But *New York Times* Middle East correspondent Dana Adams Schmidt goes beyond the immediate issue of peace and war. His placement of the conflict in its historical perspective is indeed refreshing. In doing so, he raised questions about the past and embarked on a scholarly adventure no less exciting than his account of the battles between royalists and republicans that he witnessed as a reporter.

> . . . one asks what these people were in order to understand what they are, and to divine what they may become. The answers to these questions will show that the quality of Yemen is unique—different from all the

†Dana Adams Schmidt, *Yemen: The Unknown War* (New York: Holt, Rinehart and Winston, 1968, $6.50), 316 pp.

rest of the Middle East, geographically, climatically, ethnically, and historically.

Alas, had the Egyptian interventionists but read the history of Yemen, the discomfiture, frustration, and humiliation they would have been spared! For Yemen *is* unique, and those who have sought to conquer it found their graveyard—the Ethiopians, Romans, Persians, Turks, and Egyptians. Even so, the answers Mr. Schmidt has given us did not come easily. His uncompromising bent for the truth in the struggle for Yemen exposed him to considerable danger and even a broken neck, the result of an accident in hostile and difficult terrain. But he is, after all, a courageous writer who believes in breathing his subject matter, and this element is passionately felt throughout this very readable book.

Essentially, the Yemen conflict constituted a war by proxy between Egypt and Saudi Arabia for paramount influence in the Arabian peninsula. It represented the dramatic manifestation of what Professor Malcolm Kerr refers to as the "Arab Cold War"—the unremitting rivalry between the competing conservative and republican forces in the Middle East. Necessarily, the implications of the outcome in Yemen, the hapless land once known as Arabia Felix, would be felt beyond the immediate battle zones. For Egypt, the palace coup by Yemeni republicans in September 1962 presented a much-needed opportunity to regain the initiative in Arab affairs lost during the preceding year when Syria seceded from the United Arab Republic (U.A.R.). However, the Egyptians badly miscalculated in their intelligence estimates prior to their large-scale intervention in Yemen. They failed to evaluate correctly the time, the possible fields of battle, and the attitudes of the local population. Egyptian intervention triggered involvement of Saudi Arabia, which, fearing the revolutionary upsurge on its borders, reacted by sending supplies and gold to the pro-royalist forces behind the deposed Imam. From the Saudi standpoint, Egyptian military presence constituted a dual threat to the monarchy and its oil fields. In the ensuing stalemate, what had begun as a civil war escalated rapidly into a war by proxy between the U.A.R. and Saudi Arabia; threatened extension into Aden and South Arabia; jeopardized the internal stability of both Saudi Arabia and Jordan; and increased the risk of a pro-Egyptian coup in Amman, which in turn might have triggered a clash with Israel. One might marvel at this divined chain of consequences and the logic that led to the road from San'a to Jerusalem. But one is now forced to take a hard look at the direct Soviet involvement and its ascendency within the republican camp—a situation which now bears the seeds of a direct clash between the United States and the Soviet Union. Mr. Schmidt clearly makes the point that the Yemenis have been used as pawns and their country has been used as a battlefield for a revolutionary war that has lost its intended purpose and character.

Although a strong case could be built for collective irresponsibility in the Yemen, Mr. Schmidt lowers the boom at the State Department for having "committed a fraud at the expense of the royalists" and for playing into Egyptian hands. The U.S. hoped to avert escalation by exchanging recognition of the republican regime for a withdrawal of Egyptian forces. Despite denials, the U.S. sought after all to condone the Egyptian intervention as the price for achieving a peaceful settlement that would result in a U.A.R. withdrawal. But alas, even the strenuous efforts of Ellsworth Bunker to effect the much-sought "phased withdrawal" cut no ice with the Egyptians. When the recognition policy failed, the U.S. strove for containment through a policy of inaction, on the assumption that inasmuch as Egypt lacked the physical resources for protracted war, it would sooner or later disengage of its own accord. What a pity that the wisdom of "stew in your own juice" was not initially employed, especially since the republican regime had not satisfied the normal requirements laid down by international law for recognition. But then again, hindsight apart, Britain's ill-timed issuance of the White Paper (22 February 1966), announcing its intention to withdraw from Aden by 1968, was hardly a brilliant stroke calculated to induce Nasser to withdraw from the Yemen. Nor for that matter was Saudi Arabian King Faisal's

ill-conceived proposal for an "Islamic Alliance" (an attempt to seize the initiative for Arab leadership from Nasser) and his misappraisal of the Jidda Agreement as constituting an Egyptian admission of defeat.

In the circumstances, the U.S. declined to reduce its aid program to Egypt, while at the same time recognition of the republicans had eliminated the possibility of any constructive negotiations with the royalists to seek a compromise between the two factions. How exasperating!—particularly since the royalists eventually wielded effective power in at least two-thirds of the country. Mr. Schmidt knows that the Yemeni civil war posed something more than the negative threat of "escalation" (that overworked word). The Yemen affair offered an opportunity for the new Kennedy administration to establish the credentials of the "New Frontier" in the Middle East. After all, was it not consistent with liberal professions to demonstrate that the Soviets were not the only champions of social change and progress? Where better to make the point than in the archaic, theocratic Yemen, whose Imam had surprised everyone by dying in his bed? And besides, was it not a golden opportunity to *prove* American friendship to Nasser's Egypt and wean him away from the Soviet orbit? These very elements bring the Sinai war and the Suez imbroglio of 1956 to mind. On that occasion it was assumed that American opposition to the tripartite invasion of Egypt would identify the United States with anticolonialism to the entire developing world, and particularly with the anti-Israeli sentiments of the Arab world. By saving Nasser, it was thought, the United States could align itself with Arab nationalism, thereby more adequately safeguarding the strategic and economic interests of the West. Indeed, there was enough in this formula (which Dulles lived to regret) that satisfied both idealists and realists. Now, however, the occasion seemingly called not for condemning aggression but for condoning it. American condonation of Egyptian aggression would, so it was thought, finally bring about that elusive alignment with Arab nationalism as interpreted not by Faisal but by Nasser. Thus, impelled by the same motives of 1956, the policy of recognition instituted by the Kennedy administration implied acquiescence in the destruction of the imamate even if it also threatened removal of British power in South Arabia.

Mr. Schmidt attributes the failure of American policy to the basically irreconcilable aims of promoting good relations with both the U.A.R. and Saudi Arabia. This schizophrenic posture has an analogy in the Arab-Israeli controversy, and it is well to note that both issues are rooted in Egypt's revisionist policies, under which no degree of appeasement short of American capitulation and abandonment of commitments to its allies in that region would satisfy Cairo. The Yemen war completely dissolves the excessively popular notion that, were the Arab-Israeli issue settled, relations with the Arab world would be rosy. It has further demonstrated that the more critical issues dividing Arab nations are unrelated to the continued existence of Israel and promise to keep the region in a state of continuous tension. Mr. Schmidt has done much to reveal the nature of Arab politics, but the final chapter to this incomplete story has yet to be written.

Aerospace Studies Institute

The Contributors

General Jack G. Merrell (USMA) is Commander, Air Force Logistics Command. After flying training in 1940, he served during World War II with the 39th, 491st, and 389th Bombardment Groups, as Commander of the latter. His postwar assignments have been with Air Transport Command, 1945–48, ending as Chief of Staff, MATS Atlantic Division; as Commander, Kindley AFB, Bermuda, 1949–51; Commander, 1600th Air Transport Wing, Westover AFB, Massachusetts, 1951–53; student, Air War College, 1953–54; Chief, Plans and Programs Division, later Deputy Director, Personnel Planning, DCS/P, Hq USAF, 1954–59; Deputy Commander, later Commander, Eastern Transport Air Force, MATS, 1959–60; Deputy Chief of Staff/Plans, Hq MATS, 1960–62; Director of the Budget, DCS/Comptroller, Hq USAF, 1962–64; Comptroller, Hq USAF, 1964–67; and Vice Commander-in-Chief, Hq USAFE, until his present assignment in March 1968.

Major General Frederick E. Morris, Jr., is Commander, Advanced Logistics Systems Center, AFLC, Wright-Patterson AFB, Ohio. After flying training in 1942, he served as a pilot and unit commander in both the European and Pacific theaters, completing 66 combat missions. His postwar assignments have been in programming and budget functions at Hq USAF, 1948–52; as air attaché, Netherlands, to 1956; as assistant for depot maintenance, later Director of Maintenance Engineering, San Antonio Air Materiel Area, Kelly AFB, Texas, to 1958; student, Air War College, 1958–59; in Hq USAF, DCS/Development, to 1961; with the Joint Chiefs of Staff, office of the special assistant for programs and budget, to 1963; and at Hq AFLC as Deputy Comptroller and Comptroller until his present assignment in October 1967.

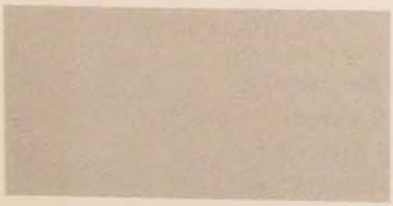
Major General Donald W. Graham (B.S.E.E., University of California; M.B.A., Harvard Business School) is Director of Maintenance Engineering, Hq Air Force Logistics Command. Commissioned from flying training in 1940, he served as instructor, squadron commander, and Commander, 357th Fighter Group, European Theater, in 1944. Postwar assignments have been in aircraft procurement and production, Air Materiel Command, to 1950; as Chief, Current Program Team and Fiscal Control Division, DCS/M, Hq USAF, to 1953; Executive Officer to Under Secretary of the Air Force to 1955; Deputy Commander, Tenth Air Division, Alaska, to 1958; student, Air War College, 1958–59; Director, Tactical and Support Systems, AMC, to 1960; Commander, Central Contract Management Region, AMC, to 1962; DCS/M, MATS, Scott AFB, Illinois, to 1965; and Commander, Twenty-first Air Force, until his present assignment in 1967.

Major General Fred J. Ascani (USMA) is Deputy Chief of Staff, Programs, Hq Air Force Logistics Command. He completed flying training in 1942 and served stateside and in the North African Theater. Postwar assignments have been with Flight Test Division, Wright-Patterson AFB, Ohio, and with Flight Test Center, Edwards AFB, California; as student, Air War College 1953–54; as a group and wing commander in Europe. Except for duty in Japan as Vice Commander, Fifth Air Force, 1965–67, he has been at Wright-Patterson since 1957: with Wright Air Development Center as DCS/P&O, Director of Laboratories, and Director of Systems Engineering; with Air Force Systems Command as Deputy Commander and B-70 Systems Program Director, Aeronautical Systems Division, and as Commander, Systems Engineering Group, with additional duty as Deputy Commander, Research and Technology Division; and with AFLC since 1967.

Wallace L. Horton has been Technical Director, Aerospace Guidance and Metrology Center, Newark Air Force Station, Ohio, since its inception in 1961. He was previously Deputy Director of Maintenance-Engineering, Dayton Air Force Depot,

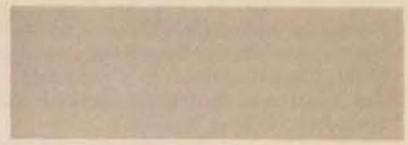
and has served in management and engineering supervisory positions with the Air Force for over 26 years. He has received the Air Force Association Management Award (1961) and the Air Force Exceptional Civilian Service Award (1966). He has written several technical articles which have been published by the Instrument Society of America, the American Ordnance Association, and in *Proceedings* of the IEEE Automatic Support Systems Symposium.

MAJOR GENERAL JOSEPH R. DELUCA (M.S., George Washington University) is Deputy Chief of Staff, Supply, Air Force Logistics Command. Commissioned from OCS in 1942, he served in the European Theater (1943–46) as Supply Officer, Eighth Air Force, and Deputy Chief of Supply, Ninth Air Force Service Command. Postwar service in various supply/logistics assignments has been with Air Materiel Command at Holloman AFB, New Mexico; Hickam AFB, Hawaii; Ogden AMA, Utah; and Wright-Patterson AFB, Ohio. In Washington, D.C., 1952–56 and 1958–64, he was in the Office of the Secretary of Defense, Defense Supply Management Agency, Armed Forces Supply Support Center, Defense Supply Agency, and the final two years as Director, Office of Supply Management Policy, OASD(I&L), and Cost Reduction Program Coordinator, DOD. He has been at Hq AFLC since 1965. He is a 1957 graduate of Air War College.



COLONEL WALTER G. VORNBROCK, JR., (M.B.A., University of Texas) is a student, Air War College. Commissioned from OCS in 1942, he served as Adjutant and Group Supply Officer, 62d Troop Carrier Group, in Europe and North Africa, reverting to inactive status from 1946 to 1951. Subsequent assignments have been as Staff Supply Officer, Hq Eighth Air Force, to 1953; student, Air Command and Staff School; Comptroller, Biggs AFB, Texas, to 1955; student, University of Texas, to 1956; Comptroller, Saudi Arabia, to 1957; in administrative positions including Deputy Chief of Budget Division, Hq Strategic Air Command, to 1963; as Comptroller, RAF Brize Norton, England, and Torrejon Air Base, Spain, to 1966; and Professor of Air Science, Miami University, Ohio, until his present assignment.

MAJOR WILLIAM T. WILSON (M.A., Stanford University) is Assistant Professor of German, USAF Academy. Commissioned upon graduation from Texas A&M in 1954, he has served as Radar Intercept Officer in two fighter squadrons of Air Defense Command; as Navigator with the 964th Airborne Early Warning and Communications Squadron, McClellan AFB, California; as Intelligence Officer in ADC fighter squadrons; and with DCS/I, Eastern Air Defense Force, and ACS/I, Alaskan Air Command. Major Wilson studied German under AFIT, has presented papers on Soviet force structuring at two symposiums of Military Operations Research Society, and is a consultant to the Hq USAF Policy Planning Studies.



CAPTAIN GERALD W. MUSSELMAN (B.A., William and Mary College) is Chief, Record Communications Operations, 1961st Communications Group, Clark Air Base, Philippines. Commissioned from OTS in 1964, he has attended Air Traffic Control Officer School, Air Ground Operations Specialist School, Communications Officer School, and Squadron Officer School. He has served with the 5th Mobile Communications Group, Robins AFB, Georgia. During 1968 he commanded the 1890th Communications Squadron, Mactan Air Base, Philippines.

CAPTAIN CARL R. OLIVER (B.A., Stanford University) is Assistant Professor of Aerospace Studies, Air Force ROTC

Detachment 50, Stanford University, California. Commissioned through AFROTC in 1962, he then completed the USAF Special Investigations School, Washington, D.C., and was a special investigations officer at Vandenberg AFB, California, until 1964. During the next year he worked in a similar assignment in South Vietnam, then was reassigned to Hq Pacific Air Forces as counterintelligence analyst. He assumed his present assignment in 1968. Captain Oliver is a graduate of the Academic Instructor School and Squadron Officer School.

PROFESSOR DONALD S. DETWILER (B.A., George Washington University; Dr. Phil., Göttingen University, Germany) is a member of the History Department, Southern Illinois University. He has also taught at West Virginia University and at American University and Catholic University in his native city of Washington. Commissioned in the Air Force reserve from ROTC in 1954, he attended Intelligence School, Shepherd AFB, Texas, and served in Germany as a language intelligence officer. He separated from active duty in 1957 to begin four years' study at Göttingen University. His book, *Hitler, Franco und Gibraltar* (1962), was written in German and published by the Institute of European History, Mainz; and his English translation of two studies on Hitler by Percy E. Schramm are being published by Quadrangle Books, Chicago.

BRIGADIER GENERAL NOEL F. PARRISH, USAF (Ret), (Ph.D., Rice University) is assistant professor of history at Trinity University, San Antonio. Commissioned from flight training in 1932, he flew with attack and transport squadrons, attended the Air Corps Technical School, and from 1938 to 1946 served in the Air Training Command as flying instructor and supervisor; Assistant Director of Training, Eastern Flying Training Command; and Director of Training, later Commander, Tuskegee Army Flying School. Other assignments were as student, Air Command and Staff School and Air War College; Deputy Secretary of the Air Staff, later Special Assistant to the Vice Chief of Staff, Hq USAF; Air Deputy, NATO Defense College, France, and Deputy Director, Military Assistance Division, U.S. European Command, 1954–56; Assistant for Coordination, DCS/Plans and Programs, Hq USAF; and Director, Aerospace Studies Institute, Air University, from 1961 until his retirement in 1964.

DR. JOSEPH CHURBA (Ph.D., Columbia University) is a member of the Documentary Research Division, Aerospace Studies Institute, and of the faculty, Air University. He was formerly Senior Middle East Specialist for the Office of National Security Studies and has served as Professor of Government at both the University of Winnipeg, Canada, and Adelphi University. Dr. Churba has contributed articles to *Military Review* and *Ideas* and is coauthor of *The Jewish Stake in Vietnam* (1967). His book entitled *Egypt and Israel in Africa* will be published in 1969. He is also author of two Air University Documentary Research Studies: *Soviet Penetration into the Middle East* (1968) and *Fedayeen and the Middle East Crisis* (1969).

AWARD

The Air University Review Awards Committee has selected "Gradualism—a Flexible Response" by Colonel Frederick J. Adelman, USAF, as the outstanding article in the May-June 1969 edition of *Air University Review*.

ATTENTION

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